cortex

User's Manual

SW-24400

24-Port PoE Managed Stackable Switch

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at whose own expense.

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This power required device does not support Standby mode operation.
For energy saving, remove the power cable to disconnect the device from the power circuit.
Without removing power cable, the device will still consume power from the power source. In the view of Saving the Energy and reduce the unnecessary power consuming, it is strongly suggested to remove the power connection for the device if this device is not intended to be active.

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To avoid the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately.

Revision

i3 International 24-Port 10/100/1000Mbps with 4 Shared SFP / 24 100/1000 SFP Slots with 8 Shared TP Managed Stackable Switch

User's Manual

FOR MODELS: SW-24400

REVISION: 1.2

1. INTRODUCTION 10

1.1 Package Contents 10

1.2 Product Features and Specification 10

2. INSTALLATION 13

2.1 Hardware Description 13

2.1.1 Switch Front Panel 13

2.1.2 LED Indicators 13

2.1.3 Switch Rear Panel 15

2.2 Installation and Connection 15

2.2.1 Desktop Installation 15

2.2.2 Rack Mounting 16

2.2.3 Installing the SFP transceiver 17

2.3 Stack Installation 19

2.3.1 Connecting Stacking cables 19

2.3.2 Management Stacking 20

3. SWITCH MANAGEMENT 22

3.1 Network and System Requirements 22

3.2 Management Access Overview 22

3.2.1 Administration Console 22

3.2.2 Command Line Interface 25

3.2.2.1. Telnet Login 26

3.2.3. Web Management 27

3.2.3.1. Main Web Page 28

3.2.4. SNMP-Based Network Management 29

3.3 Using this Manual 30

4. CONFIGURATION 31

4.1 System 31

4.1.1 System Information 31

4.1.2 IP Configuration 34

4.1.3 IPv6 Configuration 35

4.1.4 Users Configuration 35

4.1.5 Users Privilege Levels 37

4.1.6 NTP Configuration 39
4.1.7 UPnP Configuration 40
4.1.8 DHCP Relay 41
4.1.9 DHCP Relay Statistics 44
4.1.10 CPU Load 45
4.1.11 System Log 46
4.1.12 Detailed Log 47
4.1.13 Remote Syslog 48
4.1.14 SMTP Configure 48
4.1.15 Web Firmware Upgrade 50
4.1.16 TFTP Firmware Upgrade 51
4.1.17 Configuration Backup 51
4.1.18 Configuration Upload 52
4.1.19 Factory Default 53
4.1.20 System Reboot 53
4.2 Simple Network Management Protocol 53
4.2.1 SNMP Overview 53
4.2.2 SNMP System Configuration 54
4.2.3 SNMP System Information Configuration 57
4.2.4 SNMP Trap Configuration 57
4.2.5 SNMPv3 Configuration 61
4.2.5.1 Communities Configuration 61
4.2.5.2 Users Configuration 62
4.2.5.3 Groups Configuration 64
4.2.5.4 Views Configuration 66
4.2.5.5 SNMPv3 Accesses Configuration 66
4.3 Port Management 69
4.3.1 Port Configuration 69
4.3.2 Port Statistics Overview 72
4.3.3 Port Statistics Detail 73
4.3.4 SFP Module Information 75
4.3.5 Port Mirroring Configuration 76
4.4 Link Aggregation 78
4.4.1 Static Aggregation Configuration 79
4.4.2 LACP Configuration 81
4.4.3 LACP System/Port Status 84
4.4.4 LACP Port Statistics 85
4.5 VLAN 86

4.5.1 VLAN Overview 86
4.5.2 IEEE 802.1Q VLAN 87
4.5.3 VLAN Basic Information 88
4.5.4 VLAN Port Configuration 89
4.5.5 VLAN Membership Configuration 92
4.5.6 VLAN Membership Status for User Static 94
4.5.7 VLAN Port Status 94
4.5.8 Private VLAN Membership Configuration 96
4.5.9 Port Isolation Configuration 98
4.6 Spanning Tree Protocol 99
4.6.1 Theory 99
4.6.2 STP Bridge Configuration 101
4.6.3 Bridge Status 104
4.7.4 CIST Port Configuration 104
4.6.5 MSTI Priorities 108
4.6.6 MSTI Configuration 109
4.6.7 MSTI Ports Configuration 111
4.6.8 Port Status 114
4.6.9 Port Statistics 115
4.7 Multicast 116
4.7.1 IGMP Snooping 116
4.7.2 IGMP Snooping Configuration 116
4.7.3 IGMP Port Related Configuration 118
4.7.4 IGMP Snooping VLAN Configuration 119
4.7.5 Port Group Filtering 120
4.7.6 IGMP Snooping Status 121
4.7.7 MVR Configuration 122
4.7.8 MVR Status 125
4.8 Quality of Service 126
4.8.1 QCL Configuration Wizard 126
4.8.1.1 Set up Policy Rules 127
4.8.1.2 Network Application Rules 128
4.8.1.3 ToS Precedence Mapping 130
4.8.1.4 Set up VLAN Tag Priority Mapping 131
4.8.2 QoS Control List Configuration 132
4.8.2.1 QoS Control Entry Configuration 134
4.8.3 Port QoS Configuration 135
4.8.4 Bandwidth Control 137

4.8.5 Storm Control Configuration 138
4.8.6 QoS Statistics 140
4.8.7 DSCP Remarking 140
4.8.8 Voice VLAN Configuration 142
4.8.9 Voice VLAN OUI Table 144
4.9 Access Control Lists 146
4.9.1 Access Control List Status 146
4.9.2 Access Control List Configuration 147
4.9.3 ACE Configuration 150
4.9.4 ACL Ports Configuration 155
4.9.5 ACL Rate Limiter Configuration 157
4.10 Authentication 158
4.10.1 Authentication Configuration 158
4.10.2 Network Access Server Configuration 159
4.10.3 Network Access Overview 166
4.10.4 Network Access Statistics 167
4.10.5 Authentication Server Configuration 171
4.10.6 RADIUS Overview 172
4.10.7 RADIUS Details 175
4.11 Security 179
4.11.1 Port Limit Control 179
4.11.2 Access Management 183
4.11.3 Access Management Statistics 185
4.11.4 HTTPs 186
4.11.5 SSH 187
4.11.6 Port Security Status 188
4.11.7 Port Security Detail 190
4.11.8 DHCP Snooping 191
4.11.9 DHCP Snooping Statistics 192
4.11.10 IP Source Guard Configuration 194
4.11.11 IP Source Guard Static Table 196
4.11.12 ARP Inspection 197
4.11.13 ARP Inspection Static Table 198
4.12 Address Table 199
4.12.1 MAC Address Table Configuration 200
4.12.2 Static MAC Table Configuration 201
4.12.3 MAC Address Table Status 202
4.12.4 MAC Table Learning 205

4.12.5 Dynamic ARP Inspection Table 206
4.12.6 Dynamic IP Source Guard Table 207
4.13 LLDP 208
4.13.1 Link Layer Discovery Protocol 208
4.13.2 LLDP Configuration 208
4.13.3 LLDPMED Configuration 212
4.13.4 LLDP-MED Neighbour 217
4.13.5 Neighbour 219
4.13.6 Port Statistics 220
4.14 Network Diagnostics 221
4.14.1 Ping 222
4.14.2 IPv6 Ping 223
4.14.3 Remote IP Ping Test 224
4.14.4 Cable Diagnostics 224
4.15 Power over Ethernet 225
4.15.1 Power Configuration 226
4.15.2 Port Configuration 229
4.15.3 PoE Status 231
4.15.4 PoE Schedule 233
4.15.5 LLDP Neighbour Power Over Ethernet 233
4.16 Stack 234
4.16.1 Stacking Architecture 236
4.16.1.1 Switch IDs 236
4.16.1.2 Master Election 237
4.16.1.3 Stack Redundancy 237
4.16.1.4 Shortest Path Forwarding 238
4.16.2 Stack Configuration 239
4.16.3 Stack Information 241
4.16.4 Stack Port State Overview 242

5. ADDITIONAL CONSOLE COMMANDS 244

6. TROUBLESHOOTING 245

APPENDIX A. SWITCH FEATURE OPERATION 246
A.1 Address Table and Learning 246
A.2 Forwarding and Filtering 246
A.3 Store-and-Forward 246

A.4 Auto-Negotiation 247

APPENDIX B. POWER OVER ETHERNET OVERVIEW 248

B.1. PoE Introduction 248

B.2. PoE System Architecture 248

B.2.1. Power Transference through a CAT5 Ethernet cable 248

B.3. PoE Provisioning Process 249

B.3.1. Line Detection 249

B.3.2. Classification 250

B.3.3. Start-up 250

B.3.4. Operation 250

B.3.5. Power Overloads 250

APPENDEX C: ETHERNET STANDARDS 251

C.1 Switch's RJ-45 Pin Assignments 251

C.2 10/100Mbps, 10/100Base-TX 251

APPENDEX D: GLOSSARY 253

1. INTRODUCTION

The i3 International Layer 2 Managed Gigabit Switch series switches are multiple port Gigabit Ethernet Switches with SFP fibre optic connective ability and robust layer 2 features; the description of the model discussed in this manual is below.

The term "**Managed Switch**" refers to the Switch titled on the cover page of this User's manual.

1.1 Package Contents

The box should contain the following items:

The Managed Switch	x1
User's manual CD	x1
Quick installation guide	x1
19" Rack mount accessory kit	x1
Power cord	x1
Rubber feet	X4
RS-232 DB9 male Console cable	x1
CB-STX50 – 50cm stack cable	x1

If any of these are missing or damaged, please contact your dealer immediately, if possible, retain the carton including the original packing material in case of repair/return.

1.2 Product Features and Specification

IMPORTANT NOTE: This PoE network switch is recommended for IP cameras ONLY.

Product	**SW-24400**
Hardware Specification	
Copper Ports	24 10/ 100/1000Base-T RJ-45 Auto-MDI/MDI-X ports
SFP/mini-GBIC Slots	4 SFP interfaces, shared with Port-21 to Port-24
Console Port	1 x RS-232 DB9 serial port (115200, 8, N, 1)
Stacking Ports	2 5GbE / Cross-HDMI interface
Switch Fabric	68Gbps / non-blocking
Address Table	8K entries, automatic source address learning and ageing
Share data Buffer	1392 kilobytes
Switch Processing Scheme	Store-and-Forward
Flow Control	IEEE 802.3x Pause Frame for Full-Duplex Back pressure for Half-Duplex
Jumbo Frame	10Kbytes
Reset Button	< 5 seconds: System reboot > 10 seconds: Factory Default
Dimension (W x D x H)	440 x 300 x 44.5 mm, 1U high
Weight	4.5kg

LED		Power, Link/Act and speed per Gigabit port
Power Consumption		Max. 432 watts / 1473 BTU
Power Requirement – AC		AC 100~240V, 50/60Hz
Stacking Numbers		16
Stacking Architecture		Chain and Ring modes Link Aggregation groups spanning multiple switches in a stack Hardware learning with MAC table synchronization across stack Mirroring across stack available
Stacking Bandwidth		10Gbps Full-Duplex
Stack ID Display		7-Segment LED Display (1~9, A~F,0)
ESD Protection		6KV DC
Power over Ethernet		
PoE Standard		IEEE 802.3af/at PoE / PSE
PoE Power Supply Type		End-Span
PoE Power Output		Per Port 52V DC. Max. 30.8 watts
Power Pin Assignment		1/2(+), 3/6(-)
PoE Power Budget		360 Watts
PoE Management		Auto detect powered device (PD) Circuit protection prevent power interference between ports Per port PoE function enable/disable PoE Port Power feeding priority Total and per port PoE port power limit
PoE Ability	**Number of PD @ 7Watts**	24
	Number of PD @ 15.4Watts	23
	Number of PD @ 30.8Watts	11
Layer 2 Function		
Basic Management Interfaces		Console, Telnet, Web Browser, SNMPv1, v2c and v3
Secure Management Interface		SSH, SSL, SNMP v3
Management Features		Four RMON groups (history, statistics, alarms, and events) IPv6 IP Address / NTP / DNS management Built-in Trivial File Transfer Protocol (TFTP) client BOOTP and DHCP for IP address assignment Firmware upload/download via HTTP / TFTP DHCP Relay User Privilege levels control NTP (Network Time Protocol) Cable diagnostic tools
Port configuration		Port disable/enable. Auto-negotiation 10/100/1000Mbps full and half duplex mode selection. Flow Control disable / enable. Bandwidth control on each port, storm control Power saving mode control
Port Status		Display each port's speed duplex mode, link status, Flow control status. Auto negotiation status, trunk status.
VLAN		802.1Q Tagged Based VLAN ,up to 255 VLAN groups Q-in-Q Private VLAN Voice VLAN
Port trunking		IEEE 802.3ad LACP / Static Trunk Support 12 groups of 16-Port trunk support
QoS		Ingress Shaper and Egress Rate Limit per port bandwidth control

	Traffic classification based, Strict priority and WRR 4-level priority classifications: - Port Number - 802.1p priority - DS/TOS field in IP Packet - Typical network applications Supports QoS and In/Out bandwidth control on each port QoS configuration wizard for easy QoS Control List creation DSCP remarking
IGMP Snooping	IGMP (v1/v2) Snooping, up to 255 multicast Groups IGMP Querier mode support
Access Control List	IP-Based ACL / MAC-Based ACL Up to 256 entries
Additional Security Features	Source MAC / IP address binding DHCP Snooping Dynamic ARP Inspection IP Source Guard Auto DoS IP address access management
SNMP MIBs	RFC-1213 MIB-II IF-MIB RFC-1493 Bridge MIB RFC-1643 Ethernet MIB RFC-2863 Interface MIB RFC-2665 Ether-Like MIB RFC-2737 Entity MIB RFC-2618 RADIUS Client MIB RFC-2933 IGMP-STD-MIB RFC3411 SNMP-Frameworks-MIB IEEE 802.1X PAE LLDP MAU-MIB
Standards Conformance	
Regulation Compliance	FCC Part 15 Class A, CE
Standards Compliance	IEEE 802.3 10Base-T IEEE 802.3u 100Base-TX/100Base-FX IEEE 802.3z Gigabit SX/LX IEEE 802.3ab Gigabit 1000T IEEE 802.3x Flow Control and Back pressure IEEE 802.3ad Port trunk with LACP IEEE 802.1d Spanning tree protocol IEEE 802.1w Rapid spanning tree protocol IEEE 802.1s Multiple spanning tree protocol IEEE 802.1p Class of service IEEE 802.1Q VLAN Tagging IEEE 802.1x Port Authentication Network Control IEEE 802.1ab LLDP RFC 768 UDP RFC 793 TFTP RFC 791 IP RFC 792 ICMP RFC 2068 HTTP RFC 1112 IGMP version 1 RFC 2236 IGMP version 2 IEEE 802.3af Power over Ethernet IEEE 802.3at Power over Ethernet (Pre-Standard)

2. INSTALLATION

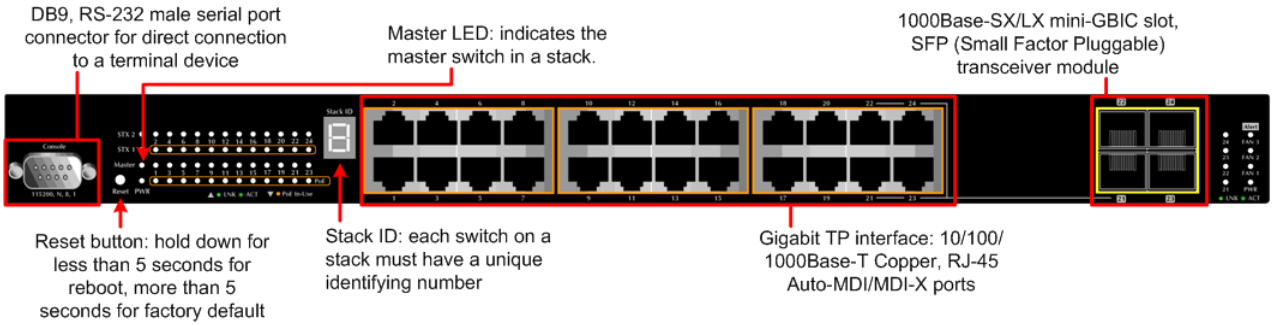
This section describes the hardware features and installation of the Managed Switch to desktop or rack mount. For easier management and control of the Managed Switch, familiarize yourself with its display indicators and ports. Read this chapter completely before connecting any network device to the Managed Switch.

IMPORTANT NOTE: This PoE network switch is recommended for IP cameras ONLY.

2.1 Hardware Description

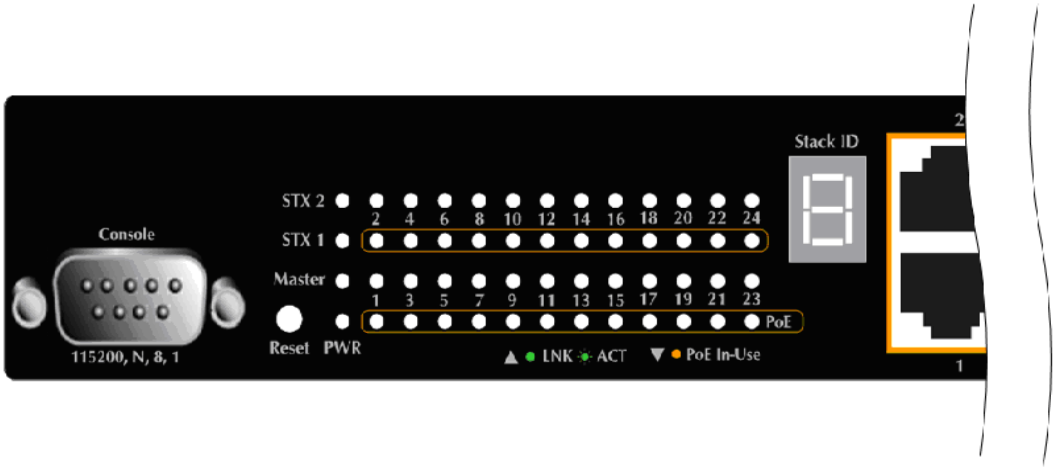
2.1.1 Switch Front Panel

The unit front panel provides a simple interface for monitoring the switch.


DB9, RS-232 male serial port connector for direct connection to a terminal device
Master LED: indicates the master switch in a stack.
1000Base-SX/LX mini-GBIC slot, SFP (Small Factor Pluggable) transceiver module
Reset button: hold down for less than 5 seconds for reboot, more than 5 seconds for factory default
Stack ID: each switch on a stack must have a unique identifying number
Gigabit TP interface: 10/100/ 1000Base-T Copper, RJ-45 Auto-MDI/MDI-X ports

2.1.2 LED Indicators

The front panel LEDs indicates the status of port links, data activity and system power in order to monitor and troubleshoot when needed.



- **System**

LED	Color	Function
PWR	**Green**	Lights to indicate that the switch is powered on. Blinks to indicate booting process.
Master	**Green**	Lights to indicate that the switch is the master of the stack group
STX1	**Green**	Lights to indicate the stacking link through that port is successfully established.
STX2	**Green**	Lights to indicate the stacking link through that port is successfully established.

- **Alert**

LED	Color	Function
PWR Alert	**Green**	Lights to indicate power supply failure
FAN1 Alert	**Green**	Lights to indicate FAN1 failure
FAN2 Alert	**Green**	Lights to indicate FAN2 failure
FAN3 Alert	**Green**	Lights to indicate FAN3 failure

- **10/100/1000Base-T interfaces**

LED	Color	Function	
LNK/ACT	**Green**	Lights	To indicate the link through that port is successfully established at a rate of 10Mbps or 100Mbps or 1000Mbps
		Blink	To indicate that the switch is actively sending or receiving data over that port.
		Off	The L10/100 NK/ACT LED indicates that the port is operating at 10Mbps or 100Mbps When the LNK/ACT LED is off, it indicates that the port is link down
PoE In-Use	**Orange**	Lights	To indicate the port is providing 48VDC in-line power
		Off	To indicate the connected device is not a PoE Powered Device (PD)

- **1000Base-SX/LX SFP interfaces (Shared Port-21~Port-24)**

LED	Color	Function	
LNK	**Green**	Lights	To indicate the link through that SFP port is successfully established at a rate of 1000Mbps
		Off	To indicate that the SFP port is link down

- **10/100/1000Base-T interfaces**

LED	Color	Function	
LNK/ACT	**Green**	Lights	To indicate the link through that port is successfully established at a rate of 10Mbps or 100Mbps or 1000Mbps
		Blink	To indicate that the switch is actively sending or receiving data over that port.
		Off	The L10/100 NK/ACT LED indicates that the port is operating at 10Mbps or 100Mbps When the LNK/ACT LED is off, it indicates that the port is link down
PoE In-Use	**Orange**	Lights	To indicate the port is providing 48VDC in-line power
		Off	To indicate the connected device is not a PoE Powered Device (PD)

➢ **1000Base-SX/LX SFP interfaces (Shared Port-21~Port-24)**

LED	Color	Function	
LNK	**Green**	Lights	To indicate the link through that SFP port is successfully established at a rate of 1000Mbps
		Off	To indicate that the SFP port is link down

➢ **7-Segment LED Display**

Stack ID (1~9, A~F, 0): indicates the Switch ID. Switch IDs are used to uniquely identify the SW-24400 switches within a stack. The Switch ID of each switch is shown on the display on the front and is used widely on web pages as well as in the CLI commands of the Stack group.

Stack ID	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**A.**	**B.**	**C.**	**D.**	**E.**	**F.**	**0**
Switch ID	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**

2.1.3 Switch Rear Panel

The rear panel of the switch indicates an AC inlet power socket, which accepts input power from 100 to 240V AC, 50-60Hz.

➢ **AC Power Receptacle**

- The power supply automatically adjusts to line power in the range of 100-240VAC and 50/60 Hz.
- Plug the female end of the power cord firmly into the receptacle on the rear panel of the switch. Plug the other end of the power cord into an electrical outlet.

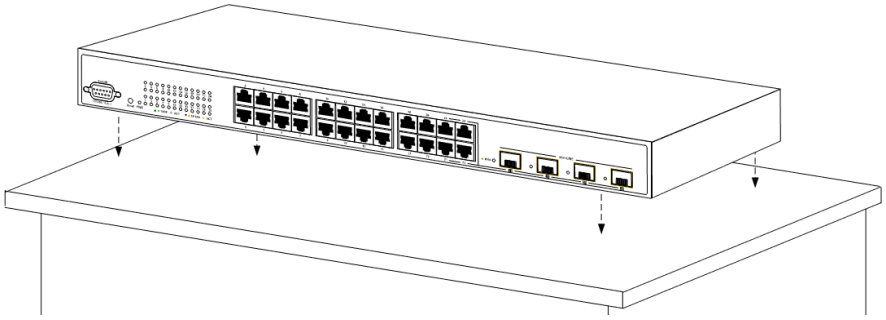
The device will not work until it is powered. If your networks are active all the time, consider using a UPS (Uninterrupted Power Supply) for your device to better avoid network data loss or network downtime.
In some areas, installing a surge suppression device may also help to protect your Managed Switch from being damaged by unregulated surges to the switch or the power adapter.

2.2 Installation and Connection

2.2.1 Desktop Installation

To install the switch on desktop or shelf:

1. Attach the rubber feet to the recessed areas on the bottom of the switch.
2. Place the switch on the desktop or the shelf near an AC power source, as shown below.



3. Keep enough ventilation space between the switch and the surrounding objects.
4. Connect the switch to network devices.
    a. Connect one end of a standard network cable to the 10/100/1000 RJ-45 ports on the front of the Managed Switch
    b. Connect the other end of the cable to the network devices.

Note

Connection to the switch requires UTP Category 5 network cabling with RJ-45 tips. For more information, please see the Cabling Specifications in Appendix A.

5. Supply power to the switch.
    a. Connect one end of the power cable to the switch.
    b. Connect the power plug of the power cable to a standard wall outlet.
    c. When the switch receives power, the Power LED should remain solid Green.

2.2.2 Rack Mounting

To install the switch in a 19-inch standard rack, follow the instructions described below.

1. Place the switch on a hard flat surface, with the front panel positioned towards the front side.
2. Attach the rack-mount bracket to each side of the switch with supplied screws attached to the package. See the illustration below for a diagram on how to attach brackets to one side of the switch

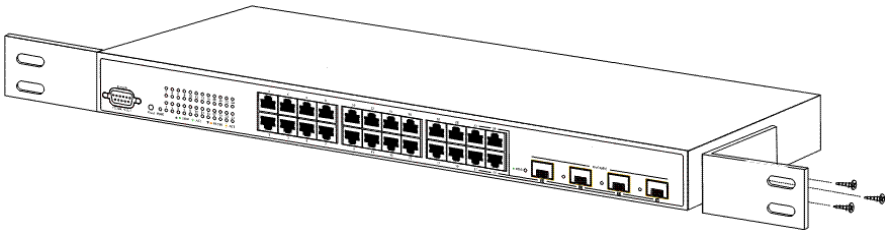


Figure2-1 *- Attach brackets to the switch.*

You must use the screws supplied with the mounting brackets. Damage caused to the parts by using incorrect screws will invalidate the warranty.

3. Secure the brackets tightly.
4. Follow the same steps to attach the second bracket to the opposite side.
5. After the brackets are attached to the switch, use suitable screws to securely attach the brackets to the rack, as shown

below.

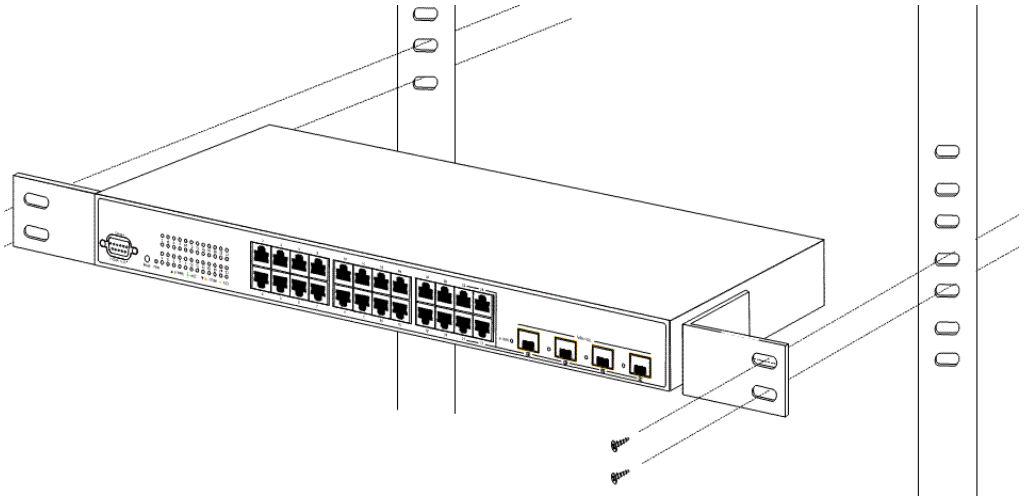


Figure2-2 *- Mounting to a Rack*

6. Refer to steps 4 and steps 5 of section 2.2.1 Desktop Installation to connect network cabling and supply power.

2.2.3 Installing the SFP transceiver

This section describes how to insert an SFP transceiver into an SFP slot. SFP transceivers are hot-pluggable and hot-swappable. You can plug-in and out the transceiver to/from any SFP port without having to power down the switch.

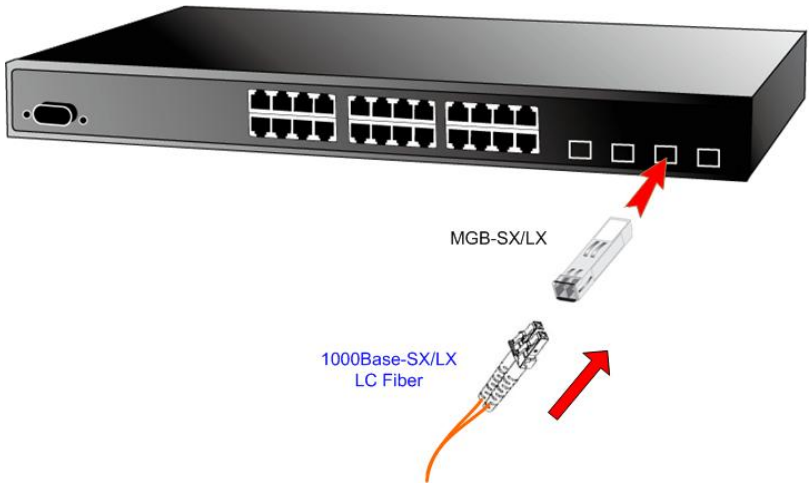


Figure 2-3 *- Plug-in the SFP transceiver*

➢ **Approved i3 International SFP Transceivers**

This i3 International Managed Switch supports both Single mode and Multi-mode SFP transceivers. Check with technical support: support@i3international for the current list of approved transceivers.

Use i3 International-approved SFPs on the switch. Unsupported SFP transceivers will not be recognized.

Before connecting other switches, workstations or Media Converters:

1. Ensure both sides of the SFP transceiver are with the same media type, for example: 1000Base-SX to 1000Base-SX, 1000Bas-LX to 1000Base-LX.
2. Check whether the fibre-optic cable type matches the SFP transceiver model.
    a. To connect to 1000Base-SX SFP transceivers, use the Multi-mode fibre cable. One side must be a male duplex LC connector.
    b. To connect to 1000Base-LX SFP transceivers, use the Single-mode fibre cable. One side must be a male duplex LC connector.

- **Connect the fibre cable**

1. Attach the duplex LC connector on the network cable to the SFP transceiver.
2. Connect the other end of the cable to a device – switches with SFP installed, fibre NIC on a workstation or a Media Converter.
3. Check the LNK/ACT LED of the SFP slot on the front of the Managed Switch. Ensure that the SFP transceiver is operating correctly.
4. Check the Link mode of the SFP port if the link failed. To work with some fiber-NICs or Media Converters, setting the Link mode to "1000 Force" is needed.

- **Remove the transceiver module**

1. Check with your network administrator to make sure there is no network activity. If possible, disable the port in advance using the management interface of the switch or converter.
2. Remove the Fibre Optic Cable.
3. Turn the handle of the MGB module to horizontal.
4. Pull out the module.

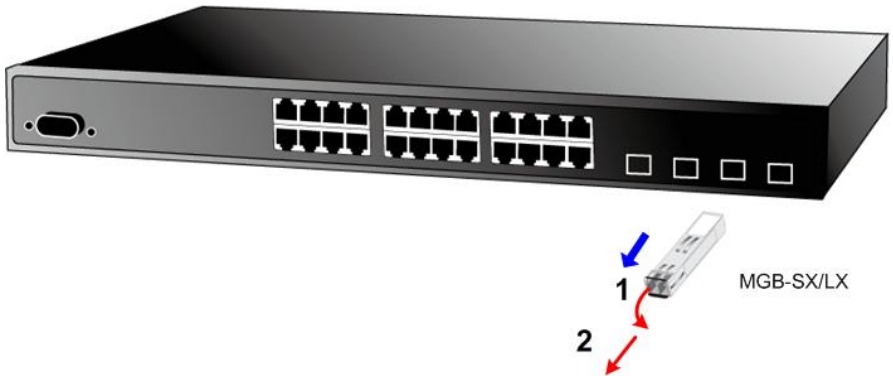


Figure 2-4 *- Pull out the SFP transceiver*

Never pull out the module without pulling the handle or the push bolts on the module. Forcibly pulling out the module may damage the module and SFP module slot of the switch.

2.3 Stack Installation

The SW-24400 Managed Switch provides a switch stacking function to manage up to 16 switches using a single IP address. Up to 384 Gigabit Ethernet ports can be managed through a stacking group and you can add ports and functionality as needed. You can add switches as needed to support more network clients, knowing that your switching fabric will scale to meet increasing traffic demands.

Two types of stack topologies are supported by the SW-24400:

- Chain topology (same as a disconnected ring)
- Ring topology

Refer to the Stack section for more details on stack topologies.

2.3.1 Connecting Stacking cables

Before attempting to connect stacking ports, verify that you have the required stack cables. The following cables are used to connect stacked switches:

- **SW-HD50:**
  - 50cm, Short stack cable –used to connect adjacent SW switches.
- **SW-HD200:**
  - 200cm, Long / Redundant stack cable – used to connect the top and bottom SW switches of a stack.

There are two high-performance HDMI-like Stack ports on the rear panel for a proprietary management stack. Only i3 International SW-HD50 and SW-HD200 cross-over HDMI cables can be used. The following are instructions for stacking using these cables:

1. Plug one end of the cable in the "**STX1 / Cascade Down**" port and the other end to the "**STX2 / Cascade UP**" port of next device.
2. Repeat the step for every device in the stack cluster.

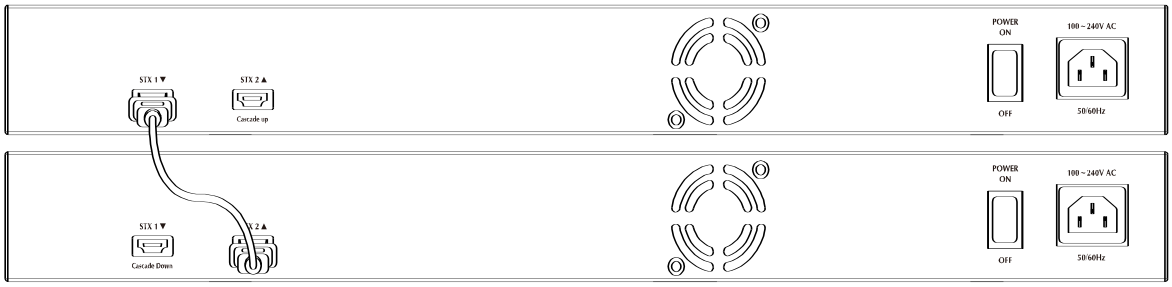


***Figure2-5** - A stacking connection*

3. To implement stack redundancy, use the long stack cable –SW-HD200 to connect the stack port marked "STX1 / Cascade Down" on the bottom switch to the port marked "STX2 / Cascade Up" on the top switch of the stack.

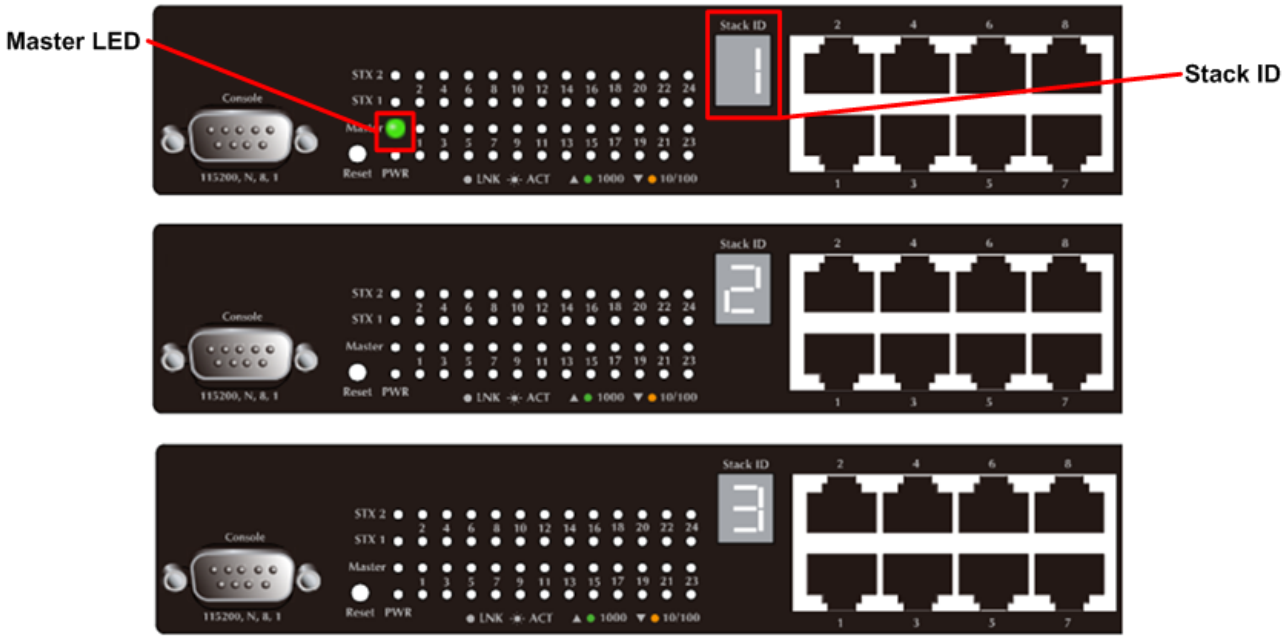
The stack port is for management and data packets to be transmitted between other SW stackable switches, the stack ports can't be configured with Layer 2 features via the management interface.

4. Power up the stack switches.

2.3.2 Management Stacking

The stack operation of the SW Managed Switch supports Plug and Play Stacking connections and auto stack configuration.

1. Once the stack is operational, the Stack Master is automatically elected. The Stack master is indicated by a lit green "Master" LED on the front panel as shown below.



2. When an SW Switch is added to the stack, a Switch ID is automatically assigned to the switch. The automatic SID assignment can be modified by choosing a different Switch ID on the Stack Configuration page. This method allows Switch IDs to be assigned so that it is easier for the user to remember the ID of each switch.
3. Connect the RS-232 serial cable to the console port on the front of the Stack Master, then join the SW Switch to start switch management.

The stack switch with lowest priority ID or MAC Address number will become Master. Only the Master switch's management interface (console, telnet, web and SNMP) is accessible.

A stack of up to 16 i3 International SW Switches may be built. If there is a space limitation or power issue and you wish to stack all the switches in different racks, use long stack cables "SW-HD200" to connect two stacks.

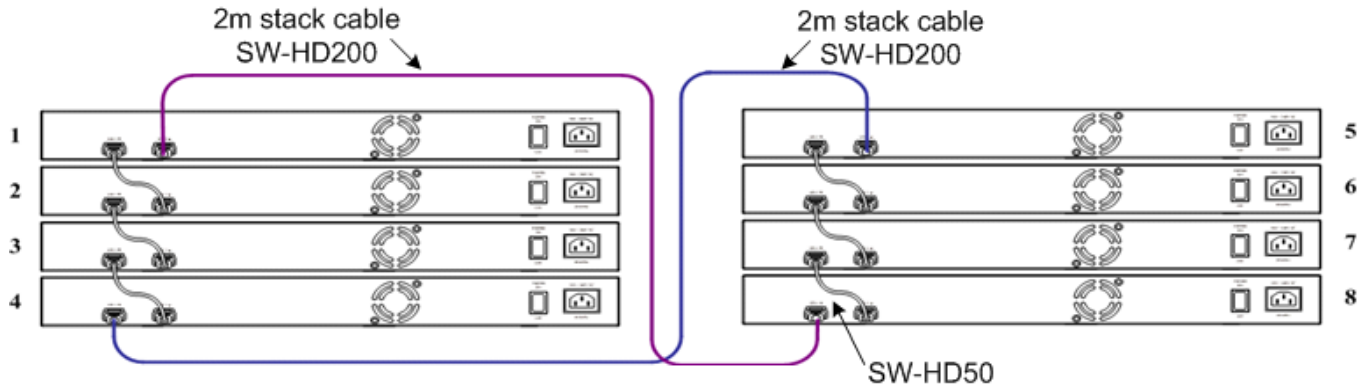


Figure2-6 - *Separated Stack connection*

3. SWITCH MANAGEMENT

This chapter explains the methods that you can use to configure management access to the Managed Switch. It describes the types of management applications and the communication and management protocols that deliver data between your management device (workstation or personal computer) and the system. It also contains information about port connection options.

This chapter covers the following topics:

- Requirements
- Management Access Overview
- Administration Console Access
- Web Management Access
- SNMP Access

3.1 Network and System Requirements

- **Workstations** running Windows 98/ME, NT4.0, 2000/XP, MAC OS9 or later, Linux, UNIX or other platforms compatible with **TCP/IP** protocols.
- **Workstation** installed with **Ethernet NIC** (Network Interface Card)
- **Serial Port** connection (Terminal)
    - An above PC with COM Port (DB9 / RS-232) or USB-to-RS-232 converter
- Ethernet Port connection
    - Network cables - Use standard network (UTP) cables with RJ45 connectors.
- Above Workstation installed with **WEB Browser** and **JAVA runtime environment** Plug-in

3.2 Management Access Overview

The following methods can be used to manage the switch

- An administration console
- Web browser interface
- An external SNMP-based network management application

The administration console and Web browser interface supports are embedded in the Managed Switch software and are available for immediate use. Each of these management methods has their own advantages. The table below compares the three management methods.

3.2.1 Administration Console

The console port is a DB9, RS-232 male serial port connector for direct connection to a terminal device. Diagnostic information

including IP Address setting, factory reset, port management, link status and system settings are provided through this interface. Users can use the attached RS-232 cable in the package and connect to the console port on the device. After the connection, users an run any terminal emulation program (Hyper Terminal, ProComm Plus, PuTTY, Telix, Winterm and so on) to enter the startup screen of the device.

The administration console is an internal, character-oriented, and command line user interface for performing system administration such as displaying statistics or changing option settings. Using this method, you can view the administration console from a terminal, personal computer, Apple Macintosh, or workstation connected to the switch's console (serial) port.

There are two ways to use this management method: via direct access or modem port access.

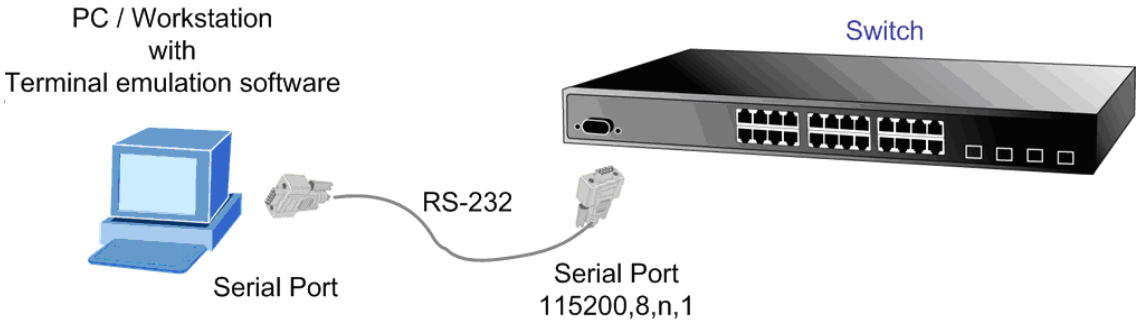


Figure3-1 *- Console management connection*

Direct Access

Direct access to the administration console is achieved by directly connecting a terminal or a PC equipped with a terminal-emulation program (such as HyperTerminal) to the Managed Switch console (serial) port. A straight DB9 RS-232 cable is required to connect the switch to the PC. After making this connection, configure the terminal-emulation program to use the following parameters:

The default parameters are:

- 115200 bps
- 8 data bits
- No parity
- 1 stop bit

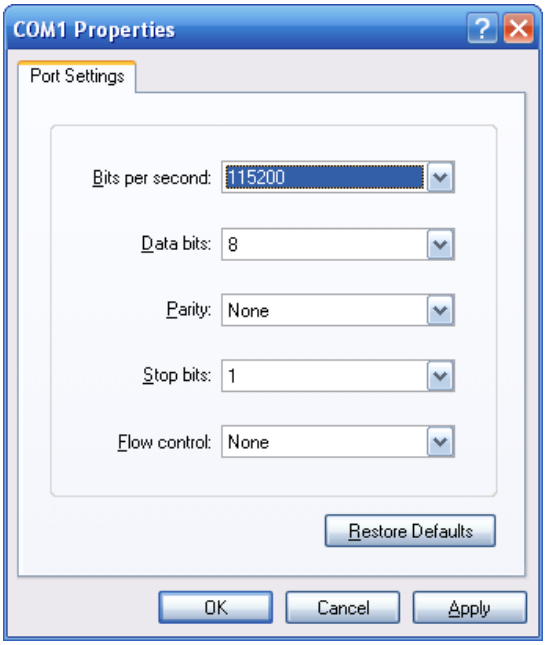


Figure3-2 *- Terminal parameter settings as seen on Windows XP*

You can change these settings after you log on. A Macintosh or PC attachment can use any terminal-emulation program for connecting to the terminal serial port. A workstation attachment under UNIX can use an emulator such as TIP.

The CLI groups all the commands in appropriate modes according to the nature of the command. A sample of the CLI command modes are described below. Each of the command modes supports specific software commands.

Command Groups:

System	System settings and reset options
Stack	Stack management
IP	IP configuration and Ping
Port	Port management
MAC	MAC address table
VLAN	Virtual LAN
PVLAN	Private VLAN
Security	Security management
STP	Spanning Tree Protocol
IGMP	Internet Group Management Protocol snooping
Aggr	Link Aggregation
LACP	Link Aggregation Control Protocol
LLDP	Link Layer Discovery Protocol
LLDPMED	Link Layer Discovery Protocol Media
PoE	Power Over Ethernet
QoS	Quality of Service
Mirror	Port mirroring
Config	Load/Save of configuration via TFTP
Firmware	Download of firmware via TFTP

UPnP	Universal Plug and Play
MVR	Multicast VLAN Registration
Voice VLAN	Specific VLAN for voice traffic
SMTP	SMTP control configure
Show	Display the current information

3.2.2 Command Line Interface

When accessing the management interface for the switch over a direct connection to the server's console port or via a Telnet connection, the switch can be managed by entering command keywords and parameters at the prompt. Using the switch's command-line interface (CLI) is very similar to entering commands on a UNIX system.

Once the terminal has connected to the device, turn the SW Managed Switch on. The terminal will display that it is running testing procedures. The following message asks for the login username and password. The factory default password and login is Username: ***admin***; Password: ***admin***

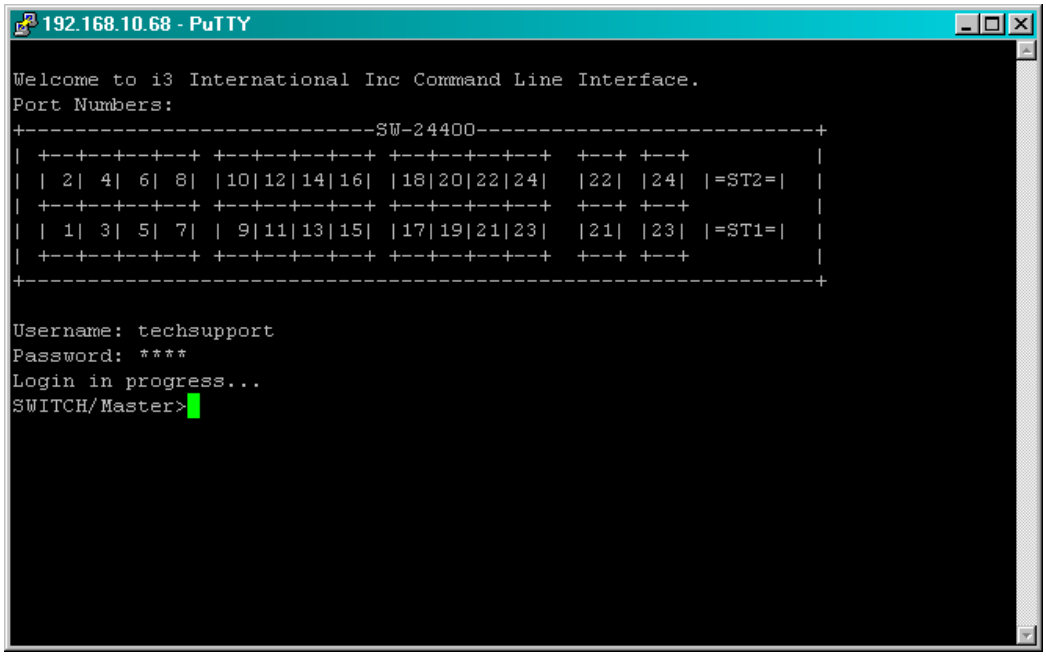


Figure3-3 - *SW Managed Switch Console Login screen*

Note

- For security reasons, change and memorize the new password after this setup.
- The console only accepts lower case commands.

The SW Managed Switch is shipped with the following IP address. IP Address: 192.0.0.20. Subnet Mask: 255.255.255.0

To check the current IP address or modify a new IP address for the Switch, do the following:

1. On the **Switch/>** prompt, input "**ip configuration**".

2. The screen displays the current IP address, Subnet Mask and Gateway as shown below.

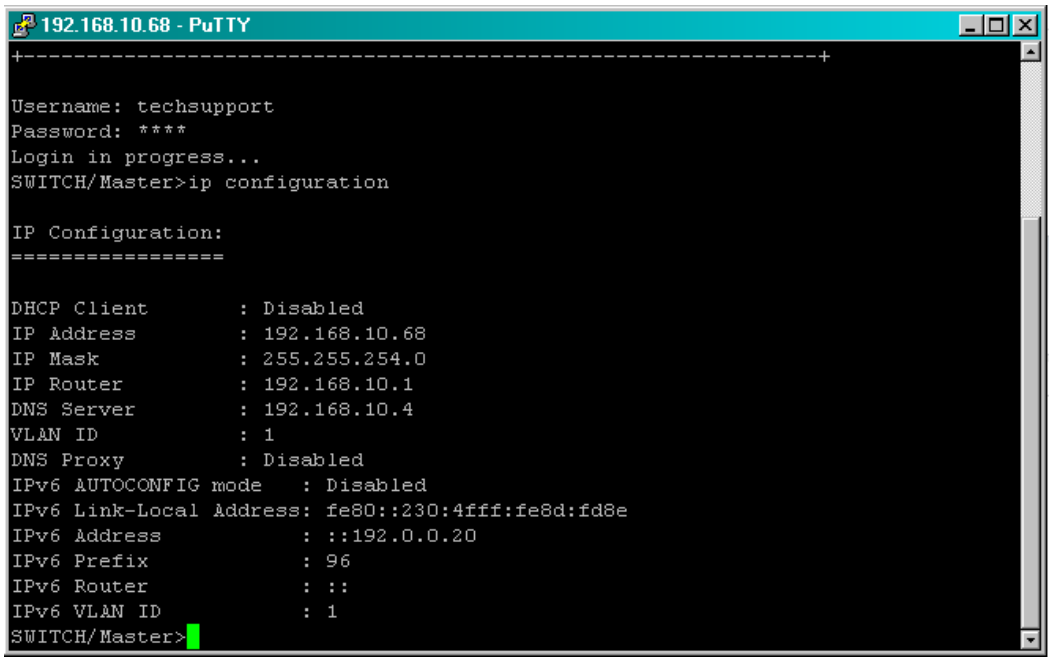


Figure3-4 *- IP information screen*

To change the IP address:

1. On the Switch/> prompt, enter the following command and press <Enter>

```
Switch/> ip setup 192.168.0.101 255.255.255.0 192.168.0.253 1
```

The above command applies the following settings to the switch.

- IP: 192.168.0.101
- Subnet Mask: 255.255.255.0
- Gateway: 192.168.0.253
- VLAN ID: 1

2. Repeat Step 1 to confirm the IP setting change.

If the IP address is successfully configured, the Managed Switch will apply the new IP address setting immediately. You can access the Web interface through the new IP address.

If you do not familiar with console command or the related parameter, enter "**help**" anytime in console to get the help description.

You can change these settings, if desired, after you log on. This management method is often preferred because you can remain connected and monitor the system during system reboots. Also, certain error messages are sent to the serial port, regardless of the interface through which the associated action was initiated. A Macintosh or PC attachment can use any terminal-emulation program for connecting to the terminal serial port. A workstation attachment under UNIX can use an emulator such as TIP.

3.2.2.1. Telnet Login

The Managed Switch also supports Telnet for remote management. The switch asks for the user name and password during a

remote login using Telnet. Input **"admin"** as the username & password.

3.2.3. Web Management

The Managed Switch can be accessed from anywhere on the network through a standard browser capable of handling Java applets such as Microsoft Internet Explorer as if you were directly connected to the Managed Switch's console port. After setting an IP address for the switch, enter the address into the browser.

You can then use your Web browser to list and access the Managed Switch configuration parameters from one central location. Web Management requires **Microsoft Internet Explorer**, **Safari** or **Mozilla Firefox**.

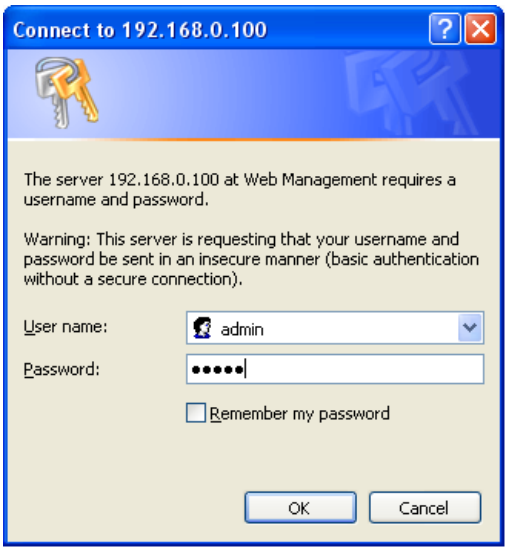
Note

By default, IE7.0 or later prevents Java Applets from opening sockets. The user has to explicitly modify the browser settings to enable Java Applets to use network ports.

The manager PC must be set on same the IP subnet address with the Managed Switch. For example, the default IP address of the SW Managed Switch is ***192.0.0.20***, thus the manager PC should be set at ***192.0.0.x*** (where x is a number between 1 and 254, except 100), and the default subnet mask is ***255.255.255.0***.

➢ **Logging onto the switch**

Using a web browser, enter the default IP address of the switch to access the Web interface. The default IP Address is: ***192.0.0.20.*** A login screen will appear. Enter the default username admin with password admin (or the username/password you have changed via console) to login to the main screen of the Managed Switch.


Connect to 192.168.0.100
The server 192.168.0.100 at Web Management requires a username and password.
Warning: This server is requesting that your username and password be sent in an insecure manner (basic authentication without a secure connection).
User name:
admin
Password:
Remember my password
OK
Cancel

Note

1. IP address changes are in effect immediately after clicking the **Save** button. You will need to use the new IP address to access the web interface.
2. For security reasons, change and memorize the new password after this first setup.
3. The web interface only accepts commands in lowercase letters.

3.2.3.1. Main Web Page

The SW-24400 Managed Switch provides a web-based browser interface for configuration and management using the web browser of your choice. This chapter describes how to use the Managed Switch's web interface.

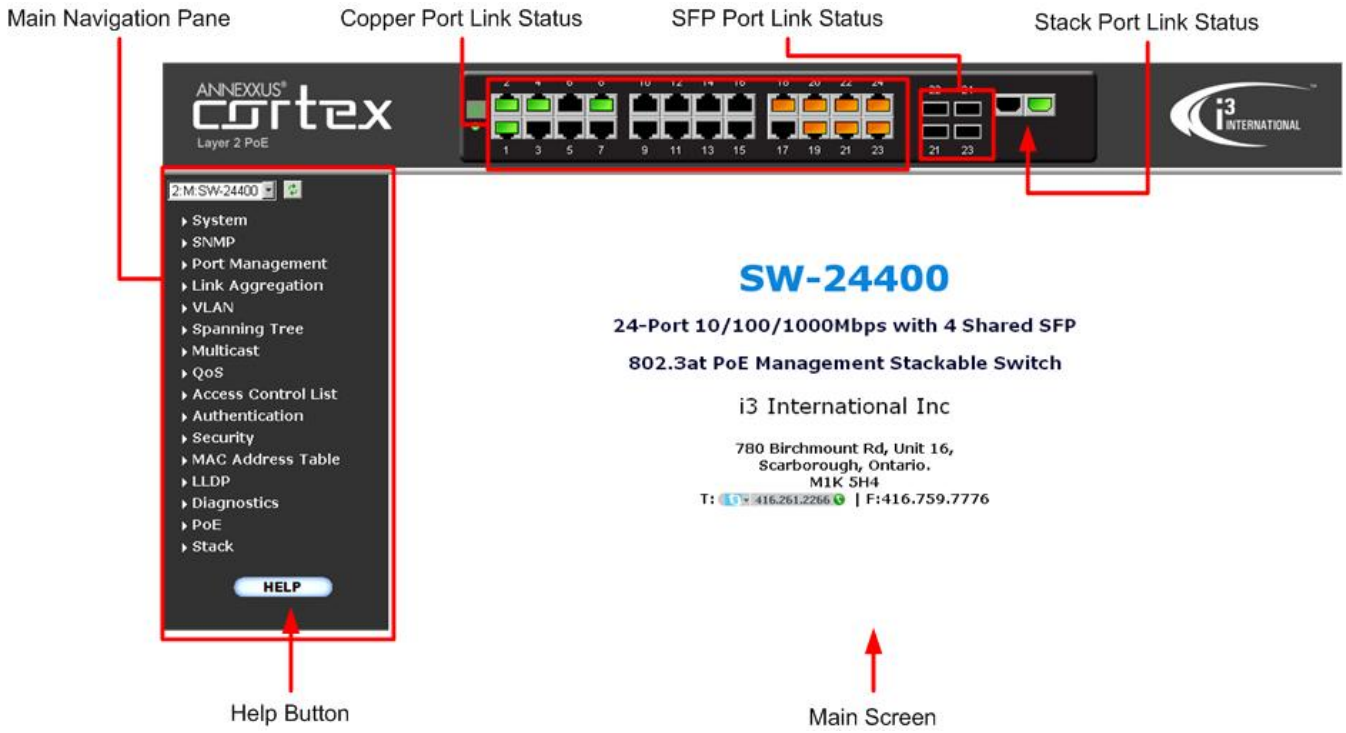


Figure3-5 *- Main Page*

➢ **Panel Display**

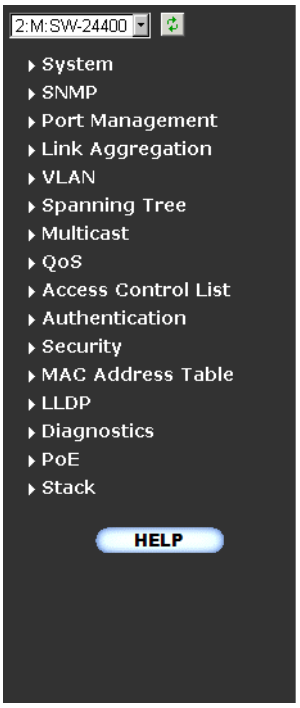
The web agent displays an image of the Managed Switch's ports. The Mode can be set to display different information about the ports, including Link up or Link down. Clicking on the image of a port opens the Port Statistics page.

The port states are illustrated as follows:

State	Disabled	Down	Link
RJ-45 Ports			
SFP Ports			
Stack Ports			

➢ **Main Navigation Pane**

Using the onboard web agent, you can define system parameters, manage and control the Managed Switch and all its ports, or monitor network conditions. Administrators can set up the Managed Switch by selecting functions.



➢ **Navigating web management screens**

Common interface features encountered in web management are given below with a description of their function. Exceptions and unique interface items will be specified in their corresponding sections:

Auto-refresh : Check this box to enable an automatic refresh of the page at regular intervals.

Refresh: Click to refresh the page; any changes made locally will be undone.

Clear: Clear all statistics. By default, clears all counters except where noted.

Save: Click to save changes. Except where noted, changes are applied only after clicking **Save**.

Reset: Click to undo any changes made locally and revert to previously saved values.

Renew: Click to undo any changes made locally and revert to previously saved values.

3.2.4. SNMP-Based Network Management

You can use an external SNMP-based application to configure and manage the switch. This management method requires the SNMP agent on the switch and the SNMP Network Management Station to use the **same community string**. This management method, in fact, uses two community strings: the **get community** string and the **set community** string. If the SNMP Network management Station only knows the set community string, it can read and write to the MIBs. However, if it only knows the get community string, it can only read MIBs. The default gets and sets community strings for the Managed Switch are public.

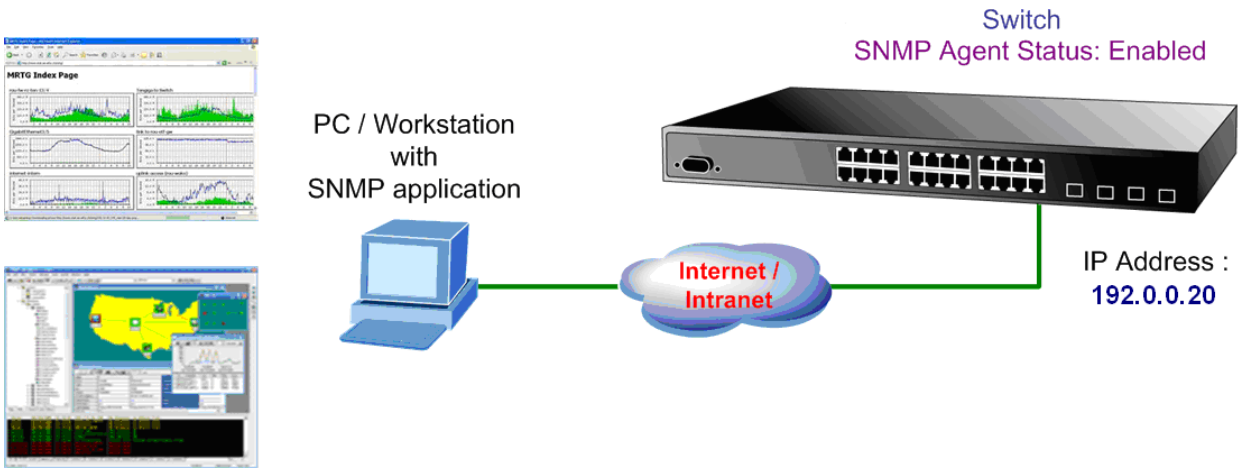


Figure3-6 *– SNMP management setup*

3.3 Using this Manual

Except as noted, this manual provides configuration details for features of the SW-24400 managed switch in order of appearance on the ewb management's Main Navigation Pane (see above for more details). A screenshot is provided, along with a table of the screen's interface objects (buttons, checkboxes, etc.) A description of the interface object's functions is given. The corresponding console commands; their syntax and parameters are listed. Description of interface objects common to all pages can be found in the Web Management section.

4. CONFIGURATION

4.1 System

Use the System menu items to display and configure basic administrative details of the Managed Switch. Under System the following topics are provided to configure and view the system information:

- **System Information:** The switch system information is provided here.
- **IP Configuration:** Configure the switch-managed IP information.
- **IPv6 Configuration:** Configure the switch-managed IPv6 information.
- **Users Configuration:** An overview of the current users. Currently the only way to login as another user on the web server is to close and reopen the browser.
- **Users Privilege Levels:** An overview of the privilege levels.
- **NTP Configuration:** Configure NTP.
- **UPnP:** Configure UPnP.
- **DHCP Relay:** Configure DHCP Relay.
- **DHCP Relay Statistics:** Provides statistics for DHCP relay.
- **CPU Load:** This page displays the CPU load, using a SVG graph.
- **System Log:** The switch system log information is provided here.
- **Detailed Log:** The switch system detailed log information is provided here.
- **Remote Syslog:** Configure remote syslog.
- **SMTP Configure:** Configure SMTP.
- **Web Firmware Upgrade:** Update firmware controlling the switch.
- **TFTP Firmware Upgrade:** Upgrade the firmware via TFTP server
- **Configuration Backup:** You can save the switch configuration. The configuration file is in XML format with a hierarchy of tags.
- **Configuration Upload:** You can load the switch configuration. The configuration file is in XML format with a hierarchy of tags.
- **Factory Default:** Reset the configuration of the stack switch. the IP configuration is retained.
- **System Reboot:** Restart the stack switch. After restart, the stack switch will boot normally.

4.1.1 System Information

System Information provides information on the current device

The following fields are included:

Object	Description

Contact	The system contact configured in Configuration | System | Information | System Contact.
Name	The system name configured in Configuration | System | Information | System Name.
Location	The system location configured in Configuration | System | Information | System Location.
MAC Address	The MAC Address of this switch.
Power Status	Indicate AC / DC power supply input of this switch.
Temperature	Indicate main chipset temperature.
System Date	The current (GMT) system time and date. The system time is obtained through the configured SNTP Server, if any.
System Uptime	The period of time the device has been operational.
Switch ID	The switch ID.
Software Version	The software version of the switch.

Console: System Log	
Description	Show or clear the system log.
Syntax	`system log` ***[<log_id>]*** **[all|info|warning|error] [clear]**
Parameters	***<log_id>***: System log ID or range (default: All entries) **all**: Show all levels (default) **info**: Show information **warning**: Show warnings **error**: Show errors **clear**: Clear log

Example:

To show system log:

```
Switch/>system log
Number of entries:
Info   : 2
Warning: 0
Error  : 0
All    : 2

ID   Level  Time                          Message
---- ------ ----------------------------  -------
1    Info   -                             Switch just made a cold boot.
2    Info   1970-01-01 Thu 00:00:04 +0000 Link up on port 10
```

Console: System Prompt	
Description	Set the CLI prompt string.
Syntax	`system prompt` ***<prompt>***
Parameters	***<prompt>***: CLI prompt string

Example:

To change CLI title:

```
Switch/>system prompt SW-24400
```

Console: System Configuration	
Description	Show system configuration.
Syntax	`system configuration` **[all]** ***[<port_list>]***
Parameters	**all**: Show all switch configuration, default: Show system configuration ***<port_list>***: Port list or 'all', default: All ports

Example:

Display system information:

```
SWITCH/>System configuration
System Contact  :
System Name     : SW-24400P
System Location :
Timezone Offset : 0
CLI Prompt     : SWITCH
MAC Address     : 00-30-4f-76-27-10
Power Status   : AC Power
Temperature    : 49.5 C - 121.1 F
System Time     : 1970-01-01 Thu 00:08:08 +0000
System Uptime   : 00:08:08
Software Version: 1.5b100623
Software Date   : 2010-06-23 15:43:02 +0800
Previous Restart: Cold

SID   Software Version
---   ---------------
1     1.5b100623
```

Console: System Name	
Description	Set or show the system name.
Syntax	`system name` ***[<name>]***
Parameters	***<name>***: System name or 'clear' to clear. Only dashes and alphanumeric characters are permitted. The first character must be alphabetic and the last character must not be a dash.

Example:

To set device title:

```
Switch/>System name SW-24400-LAB
```

Console: System Contact	
Description	Set or show the system contact.
Syntax	`system contact` ***[<contact>]***
Parameters	***<contact>***: System contact string. Use 'clear' or "" to clear the string. No blank or space characters are permitted as part of a contact. (only in CLI)
Default Setting	empty

Example:

To set device contact:

```
Switch/>System contact SW-24400-Test
```

Console: System Location	
Description	Set or show the system location.
Syntax	`system location` ***[<location>]***
Parameters	***<location>***: System location string. Use 'clear' or "" to clear the string. In CLI, no blank or space characters are permitted as part of a contact.
Default Setting	empty

Example:

To set device location:

```
Switch/>System location 9F-LAB
```

Console: System Timezone	
Description	Set or show the system timezone offset.
Syntax	`system timezone` ***[<offset>]***

Parameters	***<offset>***: Time zone offset in minutes (-720 to 720) relative to UTC
Default Setting	0

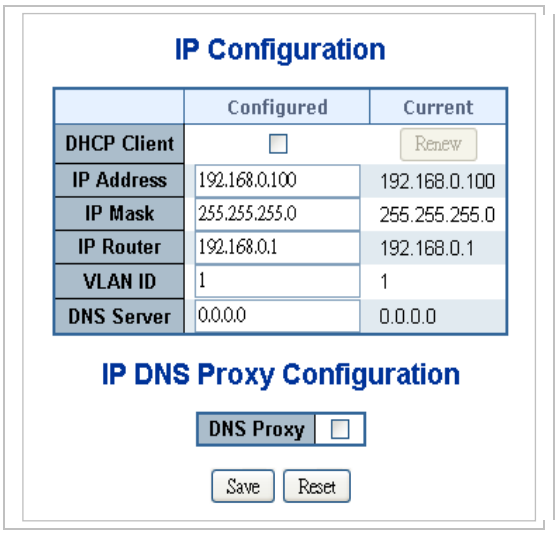
Example:

To set timezone:

```
Switch/>system timezone 0
```

4.1.2 IP Configuration

Fill out the IP Address, Subnet Mask and Gateway for the device.



The Current column is used to show the active IP configuration.

Object	Description
DHCP Client	Enable the DHCP client by checking this box. If DHCP fails and the configured IP address is zero, DHCP will retry. If DHCP fails and the configured IP address is non-zero, DHCP will stop and the configured IP settings will be used. The DHCP client will announce the configured System Name as hostname for DNS lookup.
IP Address	Provide the IP address of this switch in dotted decimal notation.
IP Mask	Provide the IP mask of this switch dotted decimal notation.
IP Router	Provide the IP address of the router in dotted decimal notation.
VLAN ID	Provide the managed VLAN ID. The allowed range is ***1*** through ***4095***.
DNS Server	Provide the IP address of the DNS Server in dotted decimal notation.
DNS Proxy	When DNS proxy is enabled, DUT will relay DNS requests to the current configured DNS server on DUT, and reply as a DNS resolver to the client device on the network.

Console: IP Configuration	
Description	Show IP configuration.
Syntax	`ip configuration`

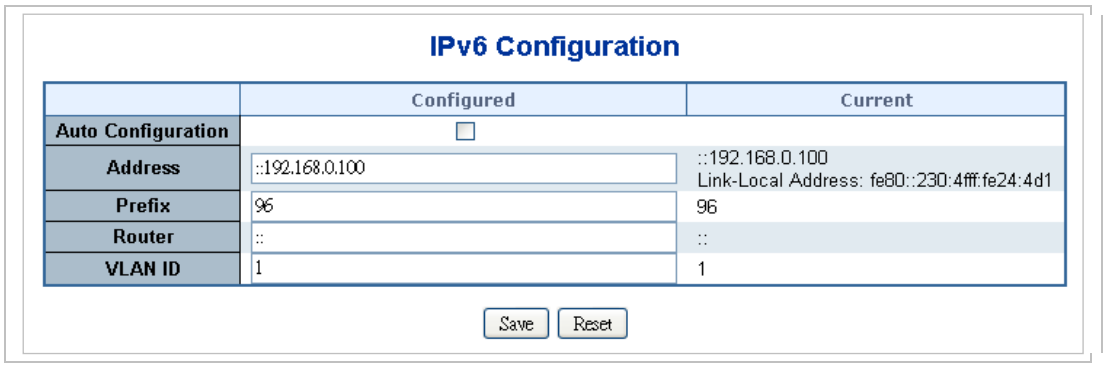
Example:

Show IP configuration:

```
Switch/>ip configuration
IP Configuration:
=================

DHCP Client       : Disabled
IP Address        : 192.0.0.20
IP Mask           : 255.255.255.0
IP Router         : 192.168.0.1
DNS Server        : 0.0.0.0
VLAN ID           : 1
DNS Proxy         : Disabled
IPv6 AUTOCONFIG mode   : Disabled
IPv6 Link-Local Address: fe80::230:4fff:fe24:4d1
IPv6 Address           : ::192.0.0.20
IPv6 Prefix            : 96
IPv6 Router            : ::
IPv6 VLAN ID           : 1
```

4.1.3 IPv6 Configuration

The Configured column is used to view or change the IPv6 configuration. The Current column is used to show the active IPv6 configuration. See the Glossary for more information on IPv6 addresses.

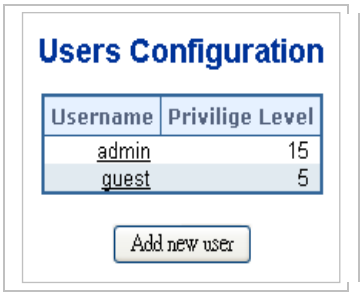


The page includes the following fields:

Object	Description
Auto Configuration	Enable IPv6 auto-configuration by checking this box.
Address	Provide the IPv6 address of this switch.
Prefix	Provide the IPv6 Prefix of this switch. The allowed range is 1 through 128.
Router	Provide the IPv6 gateway address of this switch. Provide the IPv6 SNTP Server address of this switch.
VLAN ID	Provide the managed VLAN ID. The allowed range is 1 through 4095.

4.1.4 Users Configuration

Configure and view users. To login as another user on the web server is to close and reopen the browser. After setup is completed, click **Save** for changes to take effect. Log on to the web interface with the new user name and password.



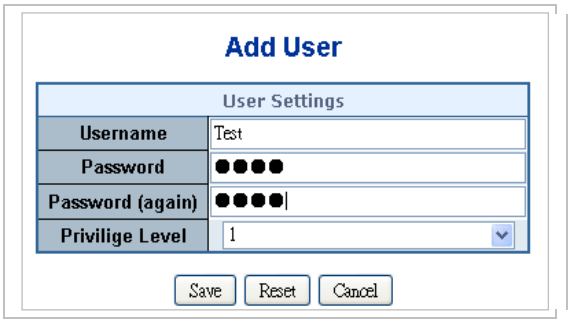
The page includes the following fields:

Object	Description
Username	The name identifying the user. This is also a link to the Add/Edit User module.
Privilege Level	The privilege level for the user.

Buttons

Add new user: Click to add a new user.

Add, edit or delete users from this screen.



The page includes the following fields:

Object	Description
Username	The name identifying the user.
Password	The password of the user.
Privilege Level	The privilege level for the user.

Buttons

Cancel: Click to undo any changes made locally and return to the Users page.

Delete User: Delete the current user. This button is not available for new configurations (Add new user)

Once the new user is added, the new user entry is shown in the Users Configuration page.

Console: Security Switch User Configuration	
Description	Show users privilege levels
Syntax	`security switch users configuration`

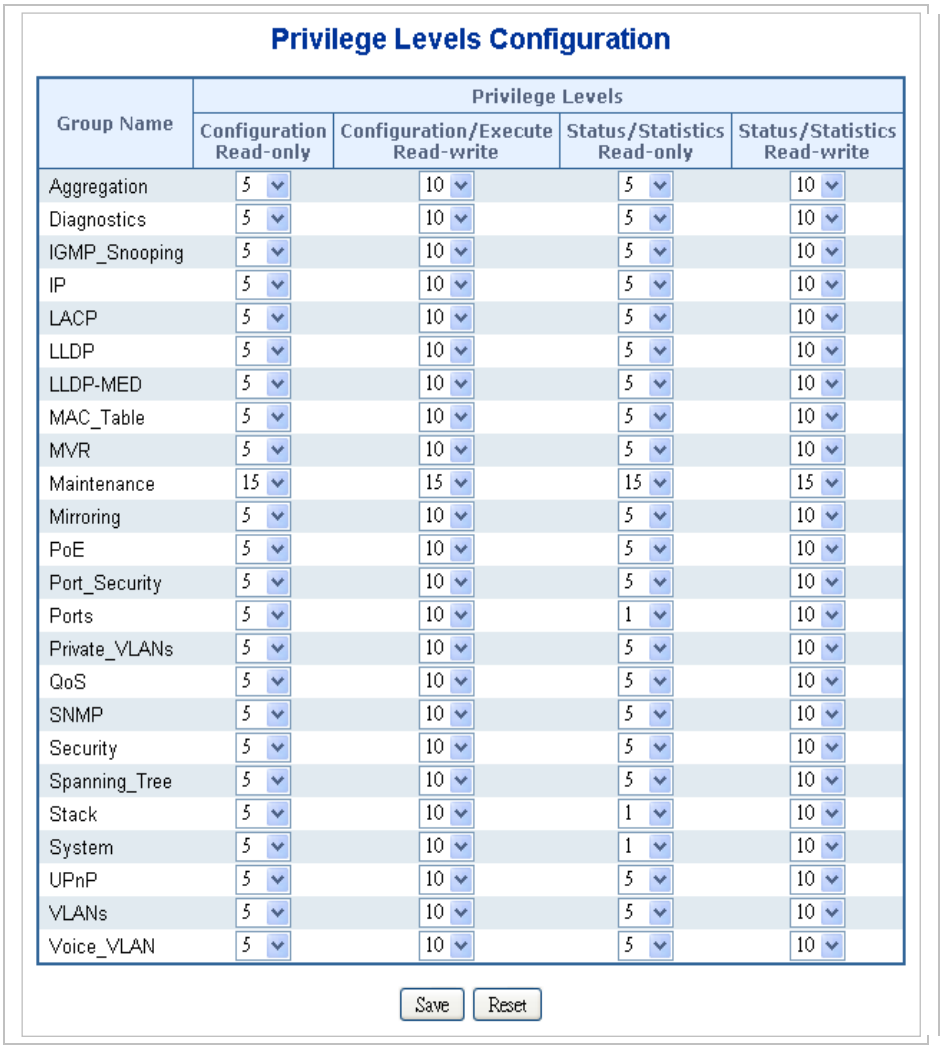
Example:

Enable isolate for port10

```
SWITCH/>security switch user configuration

Users Configuration:
====================

User Name                        Privilege Level
-----------------------------    ---------------
admin                                         15
guest                                          5
```

4.1.5 Users Privilege Levels

Configure the privledge levels available to users. After setup is completed, click **Save** in order for changes to take effect. Log on to the web interface with the new user name and password.


Privilege Levels Configuration
Group Name
Privilege Levels
Configuration Read-only
Configuration/Execute Read-write
Status/Statistics Read-only
Status/Statistics Read-write
Aggregation 5 10 5 10
Diagnostics 5 10 5 10
IGMP_Snooping 5 10 5 10
IP 5 10 5 10
LACP 5 10 5 10
LLDP 5 10 5 10
LLDP-MED 5 10 5 10
MAC_Table 5 10 5 10
MVR 5 10 5 10
Maintenance 15 15 15 15
Mirroring 5 10 5 10
PoE 5 10 5 10
Port_Security 5 10 5 10
Ports 5 10 1 10
Private_VLANs 5 10 5 10
QoS 5 10 5 10
SNMP 5 10 5 10
Security 5 10 5 10
Spanning_Tree 5 10 5 10
Stack 5 10 1 10
System 5 10 1 10
UPnP 5 10 5 10
VLANs 5 10 5 10
Voice_VLAN 5 10 5 10
Save
Reset

The page includes the following fields:

Object	Description
Group Name	The name identifying the privilege group. In most cases, a privilege level group consists of a single module (e.g. LACP, RSTP or QoS), but a few of them contain more than one. The level groups: • **System**: Contact, Name, Location, Timezone and Log. • **Security**: Authentication, System Access Management, Port (contains Dot1x port, MAC based and the MAC Address Limit), ACL, HTTPS, SSH, ARP Inspection and IP source guard. • **IP**: Everything except 'ping'. • **Port**: Everything except 'VeriPHY'. • **Diagnostics**: 'ping' and 'VeriPHY'. • **Maintenance**: CLI- System Reboot, System Restore Default, System Password, Configuration Save, Configuration Load and Firmware Load. Web- Users, Privilege Levels and everything in Maintenance. • **Debug**: Only present in CLI.
Privilege Level	Every privilege level group has an authorization level for the following sub groups: • configuration read-only • configuration/execute read-write • status/statistics read-only • status/statistics read-write (e.g. for clearing of statistics).

Console: Security Switch Privilege Level Configuration	
Description	Show privilege configuration.
Syntax	`security switch privilege level configuration`

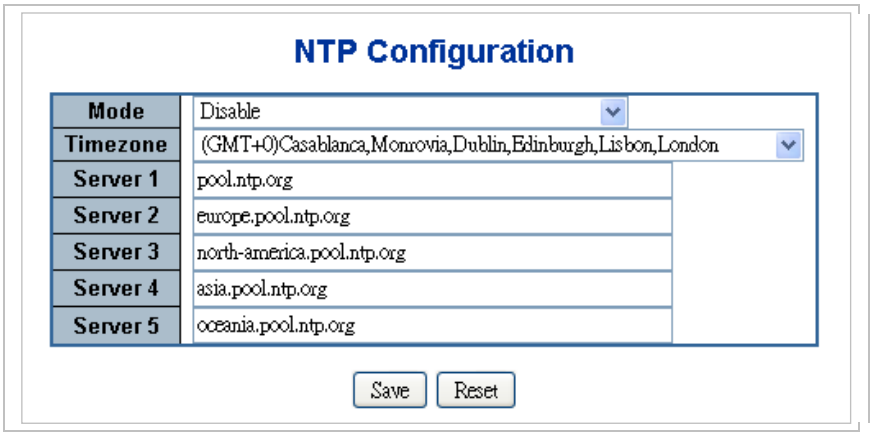
Example:

Show privilege level

```
SWITCH/>security switch privilege level configuration

Privilege Level Configuration:
==============================

Privilege Current Level: 15
Group Name                       Privilege Level
                                 CRO CRW SRO SRW
-------------------------------- --- --- --- ---
Aggregation                        5  10   5  10
Debug                             15  15  15  15
Diagnostics                        5  10   5  10
IGMP Snooping                      5  10   5  10
IP                                 5  10   5  10
LACP                               5  10   5  10
LLDP                               5  10   5  10
LLDP-MED                           5  10   5  10
MAC Table                          5  10   5  10
MVR                                5  10   5  10
Maintenance                       15  15  15  15
Mirroring                          5  10   5  10
Port_Security                      5  10   5  10
Ports                              5  10   1  10
Private VLANs                      5  10   5  10
QoS                                5  10   5  10
SNMP                               5  10   5  10
Security                           5  10   5  10
Spanning_Tree                      5  10   5  10
System                             5  10   1  10
UPnP                               5  10   5  10
VLANs                              5  10   5  10
Voice_VLAN                         5  10   5  10
```

4.1.6 NTP Configuration

Configure NTP.



The page includes the following fields:

Object	Description
Mode	Indicates the NTP mode operation. Possible modes are: • **Enabled** • **Disabled**
Timezone	Allows selecting a time zone according to current location of switch.
Server #	Provide the NTP IPv4 or IPv6 address of this switch.

Console: IP NTP Configuration	
Description	Show NTP configuration.
Syntax	`ip ntp configuration`
Default Setting	NTP Mode : Disabled Idx Server IP host address (a.b.c.d) or a host name string --- ---------- 1 pool.ntp.org 2 europe.pool.ntp.org 3 north-america.pool.ntp.org 4 asia.pool.ntp.org 5 oceania.pool.ntp.org

Console: IP NTP Mode	
Description	Set or show the NTP mode.
Syntax	`ip ntp mode` **`[enable|disable]`**
Parameters	**enable**: Enable NTP mode **disable**: Disable NTP mode (default: Show NTP mode)
Default Setting	Disable

Example:

Enable NTP mode:

```
SWITCH/>ip ntp mode enable
```

Console: IP NTP Server Add	
Description	Add NTP server entry.

Syntax	`ip ntp server add` ***<server_index> <ip_addr_string>***
Parameters	***<server_index>***: The server index (1-5) ***<ip_addr_string>***: IP host address (a.b.c.d) or a host name string
Default Setting	Disable

Example:

To add NTP server:

```
SWITCH/>ip ntp server add 1 60.249.136.151
```

Console: IP NTP Server IPv6 Add	
Description	Add NTP server IPv6 entry.
Syntax	`ip ntp server ipv6 add` ***<server_index> <server_ipv6>***
Parameters	***<server_index>***: The server index (1-5) ***<server_ipv6>***: IPv6 server address.
Default Setting	Disable

Example:

To add IPv6 NTP server:

```
SWITCH/>ip ntp server ipv6 add 1 2001:7b8:3:2c::123
```

Console: IP NTP Server Delete	
Description	Delete NTP server entry.
Syntax	`ip ntp server delete` ***<server_index>***
Parameters	***<server_index>***: The server index (1-5) ***<server_ipv6>***: IPv6 server address.

Example:

To delete NTP server:

```
SWITCH/>ip ntp server delete 1
```

4.1.7 UPnP Configuration

Configure UPnP to simplify the implementation of networks and installation of computer components.

The page includes the following fields:

Object	Description
Mode	Indicates the UPnP operation mode. Possible modes are: **Enabled** **Disabled** When the mode is enabled, two ACEs are added automatically to trap UPNP related packets to CPU. The ACEs are automatically removed when the mode is disabled.
TTL	The TTL value is used by UPnP to send SSDP advertisement messages. Valid values are in the range ***1*** to ***255***.
Advertising Duration	Specify how often control points should receive a SSDP advertisement message from this switch.

Console: UPnP Configuration	
Description	Show UPnP configuration.
Syntax	`upnp configuration`

Example:

Show UPnP configuration.

```
SWITCH/>upnp configuration

UPnP Configuration:
===================

UPnP Mode                 : Disabled
UPnP TTL                  : 4
UPnP Advertising Duration : 100
```

Console: UPnP Mode	
Description	Set or show the UPnP mode.
Syntax	`upnp mode` **`[enable|disable]`**
Parameters	**enable** : Enable UPnP **disable**: Disable UPnP (default: Show UPnP mode)
Default Setting	Disable

Example:

Enable the UPnP mode.

```
SWITCH/>upnp mode enable
```

Console: UPnP TTL	
Description	Set or show the TTL value of the IP header in SSDP messages.
Syntax	`upnp ttl` ***[<ttl>]***
Parameters	**<ttl>**: ttl range (1..255), default: Show UPnP TTL
Default Setting	4

Example:

Set the value 10 for TTL value of the IP header in SSDP messages.

```
SWITCH/>upnp ttl 10
```

Console: UPnP Advertising Duration	
Description	Set or show UPnP Advertising Duration.
Syntax	`upnp advertising duration` ***[<duration>]***
Parameters	***<duration>***: duration range (100..86400), default: Show UPnP duration range
Default Setting	100

Example:

Set value 1000 for UPnP Advertising Duration.

```
SWITCH/>upnp advertising duration 1000
```

4.1.8 DHCP Relay

Configure DHCP Relay. DHCP Relay is used to forward and to transfer DHCP messages between the clients and the server when they are not on the same subnet domain.

The **DHCP option 82** enables a DHCP relay agent to insert specific information into a DHCP request packets when forwarding client DHCP packets to a DHCP server and remove the specific information from a DHCP reply packets when forwarding server DHCP packets to a DHCP client. The DHCP server can use this information to implement IP address or other assignment policies. Specifically the option works by setting two sub-options:

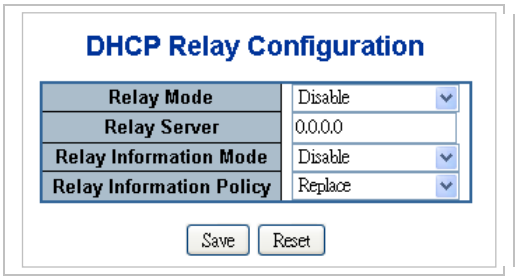
- Circuit ID (option 1)
- Remote ID (option2).

The Circuit ID sub-option includes information specific to which circuit the request came in on.

The Remote ID sub-option carries information relating to the remote host end of the circuit.

The definition of a Circuit ID in the switch is 4 bytes in length and the format is "vlan_id" "module_id" "port_no". The parameter "vlan_id" is the first two bytes represented in the VLAN ID. The parameter of "module_id" is the third byte for the module ID (in standalone switches it is always 0, in stackable switch it signifies the switch ID). The parameter of "port_no" is the fourth byte indicating the port number.

The Remote ID is 6 bytes in length, and the value is the DHCP relay agent's MAC address.



The page includes the following fields:

Object	Description
Relay Mode	Indicates the DHCP relay mode operation. Possible modes are: • **Enabled** • **Disabled**
Relay Server	Indicates the DHCP relay server IP address.
Relay Information Mode	Indicates the DHCP relay information mode option operation. Possible modes are: • **Enabled** • **Disabled**
Relay Information Policy	Indicates the DHCP relay information option policy. Possible policies are: • **Replace**: Replace the original relay information when a DHCP message that already contains it is received • **Keep**: Keep the original relay information when a DHCP message that already contains it is received. • **Drop**: Drop the package when a DHCP message already contains relay information.

Console: Security Network DHCP Relay Configuration	
Description	Show DHCP relay configuration.
Syntax	`security network dhcp relay configuration`

Example:

Show DHCP relay configuration.

```
SWITCH/>security network dhcp relay configuration

DHCP Relay Configuration:
=========================

DHCP Relay Mode               : Disabled
DHCP Relay Server             : NULL
DHCP Relay Information Mode   : Disabled
DHCP Relay Information Policy : replace
```

Console: Security Network DHCP Relay Mode	
Description	Set or show the DHCP relay mode.
Syntax	`security network dhcp relay mode` **`[enable|disable]`**
Parameters	**enable** : Enable DHCP relay mode. When enabled, agent forwards and transfers DHCP messages between the clients and the server when if not the same subnet domain. The DHCP broadcast message won't flood. **disable**: Disable DHCP relay mode (default: Show flow DHCP relay mode)

Example:

Enable DHCP relay mode

```
SWITCH/>security network dhcp relay mode enable
```

Console: Security Network DHCP Relay Server	
Description	Show or set DHCP relay server.
Syntax	`security network dhcp relay server` ***[<ip_addr>]***
Parameters	***<ip_addr>***: IP address (a.b.c.d), default: Show IP address
Default Setting	null

Example:

Set DHCP relay server in 192.168.0.20

```
SWITCH/>security network dhcp relay server 192.168.0.20
```

Console: Security Network DHCP Relay Information Mode	
Description	Set or show DHCP relay agent information option mode. When enabled, adds information to DHCP message when forwarding to DHCP server and removed from message when transferring to DHCP client.
Syntax	`security network dhcp relay information mode` **`[enable|disable]`**
Parameters	**enable** : Enable DHCP relay agent information option mode **disable**: Disable DHCP relay agent information option mode (default: Show DHCP relay agent information option mode)
Default Setting	disable

Example:

Enable DHCP relay agent information option mode.

```
SWITCH/>security network dhcp relay information mode enable
```

Console: Security Network DHCP Relay Information Policy	
Description	Set or show the DHCP relay mode. When DHCP relay information mode operation is enabled, an agent enforces the policy received by a DHCP message containing relay agent information.
Syntax	`security network dhcp relay information policy` **`[replace|keep|drop]`**
Parameters	**replace**: Replace original relay information on receiving DHCP message already containing it. **keep**: Keep original relay information on receiving a DHCP message already containing it.

	drop: Drop package when receiving a DHCP message already containing relay information (default: Show DHCP relay information policy)
Default Setting	replace

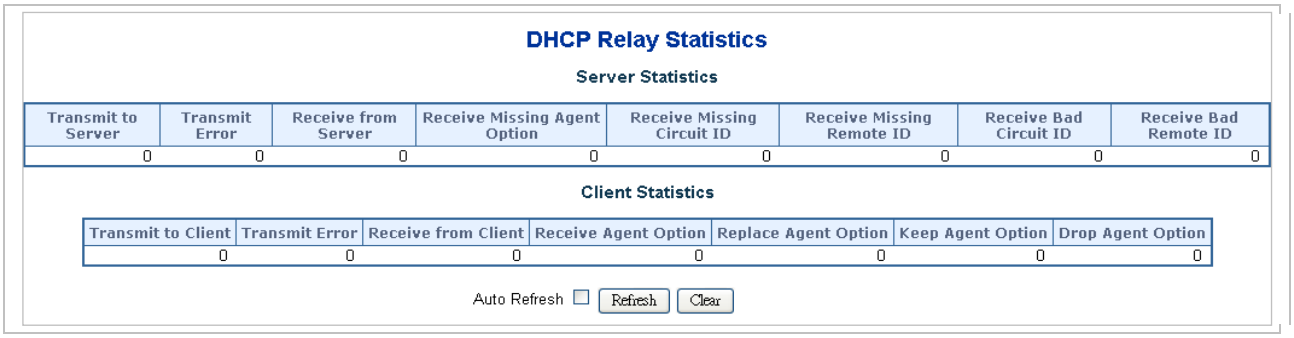
Example:

Keep the original relay information when receive a DHCP message that already contains it

```
SWITCH/>security network dhcp relay information policy keep
```

4.1.9 DHCP Relay Statistics

The webpage provides statistics for DHCP relay.



The page includes the following fields:

- **Server Statistics**

Object	Description
Transmit to Server	The number of packets relayed from clients to server.
Transmit Error	The number of erroneous packets sent to clients.
Receive from Server	The number of packets received from clients.
Receive Missing Agent Option	The number of packets received without agent information options.
Receive Missing Circuit ID	The number of packets received in which the Circuit ID option was missing.
Receive Missing Remote ID	The number of packets received in which the Remote ID option was missing.
Receive Bad Circuit ID	The number of packets received in which the Circuit ID option did not match known circuit ID.
Receive Bad Remote ID	The number of packets received in which the Remote ID option did not match known Remote ID.

- **Client Statistics**

Object	Description
Transmit to Client	The number of packets relayed from server to client.
Transmit Error	The number of erroneous packets sent to servers.
Receive form Client	The number of packets received from server.
Receive Agent Option	The number of packets received with relay agent information option.
Replace Agent Option	The number of packets replaced in received packets with relay agent information option.

Keep Agent Option	The number of packets kept in received packets with relay agent information option.
Drop Agent Option	The number of packets dropped in received packets with relay agent information option.

Console: Security Network DHCP Relay Statistics	
Description	Show or clear DHCP relay statistics.
Syntax	`Security Network DHCP Relay Statistics` **`[clear]`**
Parameters	**clear**: Clear DHCP relay statistics

Example:

Show DHCP relay statistics.

```
SWITCH/>security network dhcp relay statistics
```

4.1.10 CPU Load

This page displays the CPU load, using a SVG graph. The load is measured as averaged over the last 100 ms, 1 second and 10 seconds intervals. The last 120 samples are graphed, and the last numbers are displayed as text as well. The console command provides statistics only.

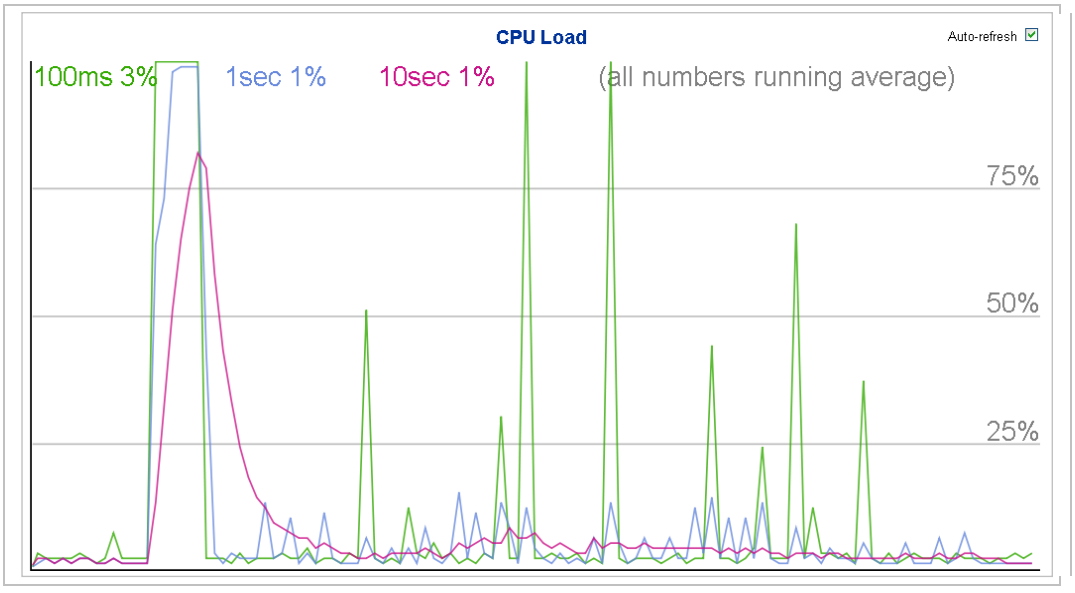


***Figure4-1** – An example CPU Load graph*

In order to display the SVG graph, your browser must support the SVG format.

Console: System Prompt	
Description	Show current CPU load: 100ms, 1s and 10s running average (in percent, zero is idle).
Syntax	`system load`

Example:

To show current CPU load:

```
Switch/>system load
Load average(100ms, 1s, 10s):   1%,   1%,   1%
```

4.1.11 System Log

The switch system log information is provided.

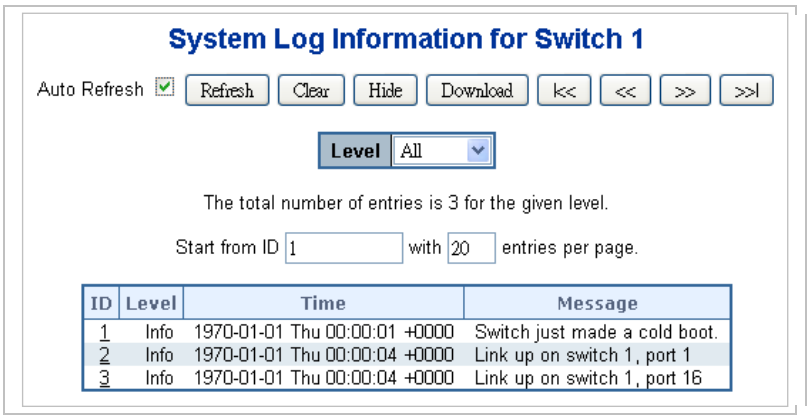

System Log Information for Switch 1
Auto Refresh
Refresh
Clear
Hide
Download
k<
<<
>>
>>|
Level
All
The total number of entries is 3 for the given level.
Start from ID 1 with 20 entries per page.
ID
Level
Time
Message
1 Info 1970-01-01 Thu 00:00:01 +0000 Switch just made a cold boot.
2 Info 1970-01-01 Thu 00:00:04 +0000 Link up on switch 1, port 1
3 Info 1970-01-01 Thu 00:00:04 +0000 Link up on switch 1, port 16

Figure4-2 *- System Log page for a switch in a stack*

The page includes the following fields:

Object	Description
ID	The ID (>= 1) of the system log entry.
Level	The level of the system log entry. The following level types are supported: • **Info**: Information level of the system log. • **Warning**: Warning level of the system log. • **Error**: Error level of the system log. • **All**: All levels.
Time	The time of the system log entry.
Message	The message of the system log entry.

Buttons

Hide: Hide the statistics.

Download: Download the statistics.

k<: Updates the system log entries, starting from the first available entry ID.

<<: Updates the system log entries, ending at the last entry currently displayed.

>> : Updates the system log entries, starting from the last entry currently displayed.

>>| : Updates the system log entries, ending at the last available entry ID.

4.1.12 Detailed Log

The switch system detailed log information is provided.

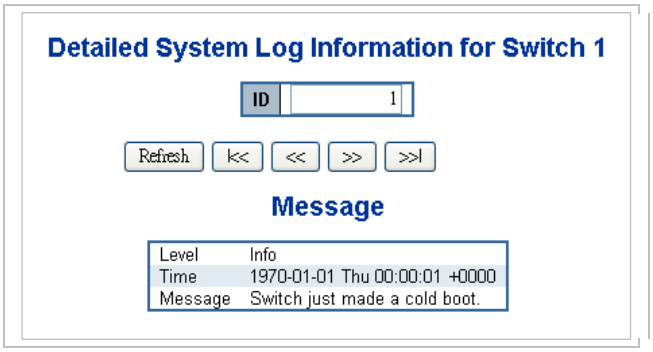


***Figure 4-2** - Detailed Log page for a switch in a stack*

The page includes the following fields:

Object	Description
ID	The ID (>= 1) of the system log entry.
Message	The message of the system log entry.

Buttons

Refresh : Click to refresh the page; any changes made locally will be undone.

|<< : Updates the system log entries, starting from the first available entry ID.

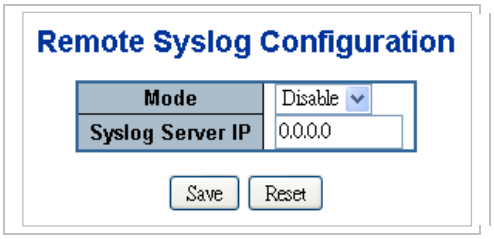
<< : Updates the system log entries, ending at the last entry currently displayed.

>> : Updates the system log entries, starting from the last entry currently displayed.

>>| : Updates the system log entries, ending at the last available entry ID.

4.1.13 Remote Syslog

Configure remote syslog.

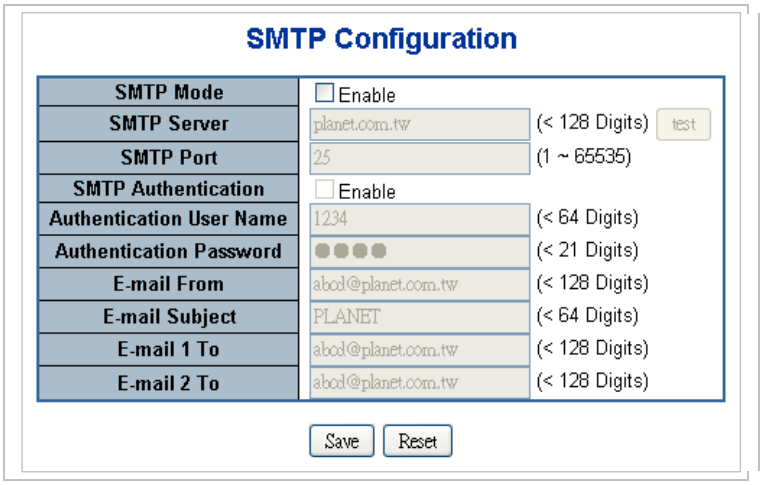


The page includes the following fields:

Object	Description
Mode	Indicates the remote syslog mode operation. Possible modes are: • **Enabled** • **Disabled**
Syslog Server IP	Fill in your remote syslog server IP address.

4.1.14 SMTP Configure

Configure SMTP



The page includes the following fields:

Object	Description
SMTP Mode	Controls whether SMTP is enabled on this switch.
SMTP Server	Type the SMTP server name or the IP address of the SMTP server.
SMTP Port	Set port number of SMTP service.
SMTP Authentication	Controls whether SMTP authentication is enabled if authentication is required when an e-mail is sent.
Authentication User Name	Type the user name for the SMTP server if Authentication is enabled.

Authentication Password	Type the password for the SMTP server if Authentication is enabled.
E-mail From	Type the sender's E-mail address. This address is used for reply e-mails.
E-mail Subject	Type the subject/title of the e-mail.
E-mail 1 To	Type the receiver's e-mail address.
E-mail 2 To	

Buttons

test: Send a test mail to mail server to check this account is available or not.

Console: SMTP Configuration	
Description	Show SMTP configuration.
Syntax	`smtp configuration`
Default Setting	disable

Console: SMTP Mode	
Description	Enable or disable SMTP.
Syntax	`smtp mode` **`[enable|disable]`**
Parameters	**enable**: Enable SMTP mode **disable**: Disable SMTP mode (default: Show SMTP mode)
Default Setting	disable

Console: SMTP Server	
Description	Set or show SMTP server configuration.
Syntax	`smtp server` ***[<server>] [<port>]***
Parameters	***<server>***: SMTP server address ***<port>***: SMTP server port
Default Setting	disable

Console: SMTP Authentication	
Description	Enable or disable SMTP authentication configuration.
Syntax	`smtp auth` **`[enable|disable]`**
Parameters	**enable**: Enable SMTP Authentication **disable**: Disable SMTP Authentication (default: Show SMTP Authentication)
Default Setting	disable

Console: SMTP Authentication User	
Description	Set or show SMTP authentication user name.
Syntax	`smtp auth_user` ***[<auth_user_text>]***
Parameters	***<auth_user_text>***: SMTP Authentication User Name
Default Setting	disable

Console: SMTP Authentication Password	
Description	Set or show SMTP authentication password.
Syntax	`smtp auth_pass` ***[<auth_pass_text>]***
Parameters	**<auth_pass_text>**: SMTP Authentication Password
Default Setting	disable

Console: SMTP Mailfrom	
Description	Set or show SMTP e-mail sender information.
Syntax	`smtp mailfrom` ***[<mailfrom_text>]***
Parameters	***<mailfrom_text>***: SMTP E-mail From address

Default Setting	disable

Console: SMTP Mailsubject	
Description	Set or show SMTP e-mail subject.
Syntax	`smtp mailsubject` ***[<mailsubject_text>]***
Parameters	***<mailsubject_text>***: SMTP E-mail Subject
Default Setting	disable

Console: SMTP Mailto1	
Description	Set or show SMTP primary email.
Syntax	`smtp mailto1` ***[<mailto1_text>]***
Parameters	***<mailto1_text>***: SMTP e-mail 1 to address
Default Setting	disable

Console: SMTP Mailto2	
Description	Set or show SMTP secondary email.
Syntax	`smtp mailto2` ***[<mailto2_text>]***
Parameters	**<mailto1_text>**: SMTP e-mail 2 to address
Default Setting	disable

4.1.15 Web Firmware Upgrade

Update the firmware controlling the switch.

To open the Firmware Upgrade screen:

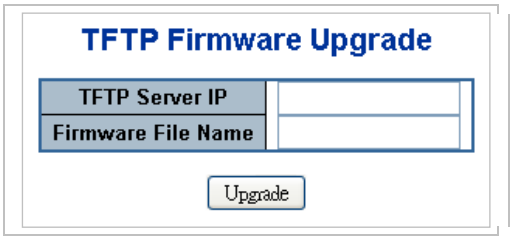
1. Click System -> Web Firmware Upgrade.
2. The Firmware Upgrade screen appears
3. Click the **Browse** button of the main page, an Open File dialog will appear.
4. Select firmware file, then click **Upload**. The software will being uploading.
5. Once the software is loaded, a confirmation screen will appear. The new software will load after rebooting.

DO NOT Power OFF the Managed Switch until the update progress is complete.

Do not quit the Firmware Upgrade page without press the "**OK**" button - after the image be loaded. Or the system won't apply the new firmware. User has to repeat the firmware upgrade processes again.

4.1.16 TFTP Firmware Upgrade

The **Firmware Upgrade** page updates the Managed Switch firmware from the TFTP server in the network. Before updating, make sure you have your TFTP server ready and the firmware image is on the TFTP server.



The page includes the following fields:

Object	Description
TFTP Server IP	Fill in your TFTP server IP address.
Firmware File Name	The name of firmware image. (Maximum length: 24 characters)

Buttons

Upload: Click to upgrade firmware.

Note

DO NOT Power OFF the Managed Switch until the update is complete.

Note

Do not quit the Firmware Upgrade page before the confirmation image has loaded or without pressing the "**OK**" button. The changes will not be saved and firmware update must be performed again.

Console: Firmware Load	
Description	Load new firmware from TFTP server.
Syntax	`firmware load [<ip_addr_string>|<ipv6_server>] <file_name>`
Parameters	***<ip_addr_string>***: IP host address (a.b.c.d) or a host name string ***<ipv6_server>***: TFTP server IPv6 address ***<file_name>***: Firmware file name

4.1.17 Configuration Backup

This function backs up and reloads saved configurations of the Managed Switch to the local management station.

You can save/view or load the switch configuration. The configuration file is in XML with the following hierarchical tags.

Header tags:	<?xml version="1.0"?> and <configuration>. These tags are mandatory and must be present at the beginning of the file.
Section tags:	<platform>, <global> and <switch>. The platform section must be the first section tag and this section must include the correct platform ID and version. The global section is optional and includes configurations unrelated to specific switch ports. The switch section is optional and includes configuration which is related to specific switch ports.
Module tags:	<ip>, <mac>, <port> etc. These tags identify a module controlling specific parts of the configuration.
Group tags:	<port_table>, <vlan_table> etc. These tags identify a group of parameters, typically a table.
Parameter tags:	<mode>, <entry> etc. These tags identify parameters for the specific section, module and group. The <entry> tag is used for table entries.

Configuration parameters are represented as attribute values. When saving the configuration from the switch, the entire configuration including syntax descriptions is included in the file. The file may then be modified using an editor and loaded to a switch.

- **Save Configuration**

1. Press the **Save Configuration** button to save the current configuration in the manager workstation.
2. Chose the file save path in management workstation.

Console: Configuration Save	
Description	Save configuration to TFTP server.
Syntax	`config save` ***<ip_server> <file_name>***
Parameters	***<ip_server>***: TFTP server IP address (a.b.c.d) ***<file_name>***: Configuration file name

4.1.18 Configuration Upload

This function allows backup and reload the current configuration of the Managed Switch to the local management station.

- **Configuration Upload**

1. Click the **Browse** button of the main page, the Open File dialog will appear.
2. Select on the configuration file then click **Upload**. Upload will begin.
3. The message "Transfer Completed" will appear.

Console: Configuration Load	
Description	Load configuration from TFTP server.
Syntax	`config load` ***<ip_server> <file_name>*** **`[check]`**
Parameters	***<ip_server>***: TFTP server IP address (a.b.c.d) ***<file_name>***: Configuration file name **check**: Check configuration file only, default: Check and apply file

4.1.19 Factory Default

You can reset the configuration of the stack switch on this page. Only the IP configuration is retained. The new configuration is available immediately, which means that no restart is necessary. A screen will appear asking you to confirm the reset. Click **Yes** to confirm, **No** to cancel and return to the Port Status page.

After the **Factory** button is pressed and the system rebooted, the following settings will be in place:

- Default IP address: 192.0.0.20
- Subnet mask: 255.255.255.0
- Default Gateway: 192.168.0.254
- The other setting values will be either disabled or set to "none."

Console: System Restore Default	
Description	Restore factory default configuration.
Syntax	`system restore default` **`[keep_ip]`**
Parameters	**keep_ip**: Keep IP configuration, default: Restore full configuration

Example:

To restore default value but not reset IP address:

```
Switch/>system restore default keep_ip
```

4.1.20 System Reboot

The **Reboot** page enables the device to be rebooted from a remote location. Once the Reboot button is pressed, re-enter the login information. After a sixty-second delay, the switch will ask for confirmation. Click the **Yes** button to reboot, or **No** to cancel and return to the Port Status page.

You can also check the SYS LED on the front panel. If the SYS LED is blinking, the firmware is being loaded; if the SYS LED is on, the web browser may be used to login to the Switch.

Console: System Reboot	
Description	Reboot the system without changing settings
Syntax	`system reboot`

4.2 Simple Network Management Protocol

4.2.1 SNMP Overview

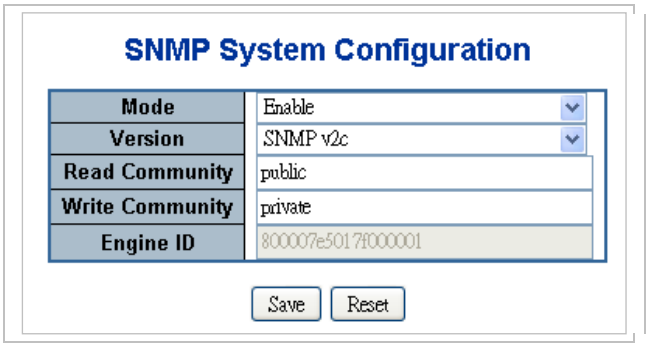
The Simple Network Management Protocol (SNMP) is an application layer protocol that facilitates the exchange of management information between network devices. It is part of the Transmission Control Protocol/Internet Protocol (TCP/IP) protocol suite. SNMP enables network administrators to manage network performance, find and solve network problems, and plan for network growth.

Use the SNMP Menu to display or configure the Managed Switch's SNMP function. The webpage has the following items:

- **System Configuration:** Configure SNMP on this page.
- **System Information:** The system information is provided here.
- **Trap Configuration:** Configure SNMP trap on this page.
- **SNMPv3 Communities:** Configure SNMPv3 communities table on this page.
- **SNMPv3 Users:** Configure SNMPv3 users table on this page.
- **SNMPv3 Groups:** Configure SNMPv3 groups table on this page.
- **SNMPv3 Views:** Configure SNMPv3 views table on this page.
- **SNMPv3 Accesses:** Configure SNMPv3 accesses table on this page.

4.2.2 SNMP System Configuration

Configure SNMP.



The page includes the following fields:

Object	Description
Mode	Indicates the SNMP mode operation. Possible modes are: • **Enabled** • **Disabled**
Version	Indicates the SNMP supported version. Possible versions are: • **SNMP v1** • **SNMP v2c** • **SNMP v3**
Read Community	Indicates the community read access string to permit access to SNMP agent. **
Write Community	Indicates the community write access string to permit access to SNMP agent. **
Engine ID	Indicates the SNMPv3 engine ID. ***

Note

** The allowed string length is 0 to 255 and ASCII characters from 33 to 126 may be used. The field is only applicable to SNMPv1 and SNMPv2c. SNMPv3 uses USM for authentication and privacy. The community string is associated with the SNMPv3 communities table

*** The string must contain an even number between 10 and 64 hexadecimal digits, but all-zeros and all-'F's are not allowed. Change of the Engine ID will clear all original local users.

Console: Security Switch SNMP Configuration	
Description	Show SNMP configuration.
Syntax	`security switch snmp configuration`

Example:

Show SNMP configuration.

```
SWITCH/>security switch snmp configuration

SNMP Configuration:
===================

SNMP Mode                     : Enabled
SNMP Version                  : 2c
Read Community                : public
Write Community               : private
Trap Mode                     : Disabled
Trap Version                  : 1
Trap Community                : public
Trap Destination              :
Trap IPv6 Destination         : ::
Trap Authentication Failure   : Enabled
Trap Link-up and Link-down    : Enabled
Trap Inform Mode              : Enabled
Trap Inform Timeout (seconds) : 1
Trap Inform Retry Times       : 5
Trap Probe Security Engine ID : Enabled
Trap Security Engine ID       :
Trap Security Name            : None

SNMPv3 Engine ID : 800007e5017f000001

SNMPv3 Communities Table:
Idx Community                       Source IP        Source Mask
--- ------------------------------- ---------------- ---------------
1   public                          0.0.0.0          0.0.0.0
2   private                         0.0.0.0          0.0.0.0

Number of entries: 2

SNMPv3 Users Table:
Idx Engine ID User Name                         Level          Auth Priv
--- --------- --------------------------------- -------------- ---- ----
1   Local     default_user                      NoAuth, NoPriv None None

Number of entries: 1

SNMPv3 Groups Table;
Idx Model Security Name                     Group Name
--- ----- --------------------------------- --------------------------------
1   v1    public                            default ro group
2   v1    private                           default_rw_group
3   v2c   public                            default_ro_group
4   v2c   private                           default rw group
5   usm   default user                      default rw group

Number of entries: 5

SNMPv3 Views Table:
Idx View Name                       View Type OID Subtree
--- ------------------------------- --------- --------------------------------
1   default_view                    included  .1

Number of entries: 1

SNMPv3 Accesses Table:
Idx Group Name                      Model Level
--- ------------------------------- ----- --------------
1   default ro group                any   NoAuth, NoPriv
2   default_rw_group                any   NoAuth, NoPriv

Number of entries: 2
```

Console: Security Switch SNMP Mode	
Description	Set or show the SNMP mode.

Syntax	`security switch snmp mode` **`[enable|disable]`**
Parameters	**enable** : Enable SNMP **disable**: Disable SNMP (default: Show SNMP mode)
Default Setting	Enable

Example:

Disable SNMP mode.

```
SWITCH/>security switch snmp mode disable
```

Console: Security Switch SNMP Version	
Description	Set or show the SNMP protocol version.
Syntax	`security switch snmp version` **`[1|2c|3]`**
Parameters	**1**: SNMP version 1 **2c**: SNMP version 2c **3**: SNMP version 3 (default: Show SNMP version)
Default Setting	2c

Example:

Set SNMP in version 3.

```
SWITCH/>security switch snmp version 3
```

Console: Security Switch SNMP Read Community	
Description	Set or show the community string for SNMP read access.
Syntax	`security switch snmp read community` ***[<community>]***
Parameters	***<community>***: Community string. Use 'clear' or "" to clear the string (default: Show SNMP read community)
Default Setting	public

Example:

Set SNMP read community private.

```
SWITCH/>security switch snmp read community private
```

Console: Security Switch SNMP Write Community	
Description	Set or show the community string for SNMP write access.
Syntax	`security switch snmp write community` ***[<community>]***
Parameters	***<community>***: Community string. Use 'clear' or "" to clear the string (default: Show SNMP write community)
Default Setting	private

Example:

Set public value in SNMP write community.

```
SWITCH/>security switch snmp write community public
```

Console: Security Switch SNMP Trap Probe Security Engine ID	
Description	Show SNMP trap security engine ID probe mode.
Syntax	`security switch snmp trap probe security engine id` **`[enable|disable]`**
Parameters	**enable** : Enable SNMP trap security engine ID probe **disable**: Disable SNMP trap security engine ID probe (default: Show SNMP trap security engine ID probe mode)

Default Setting	Enable

Example:

Disable SNMP trap probe security engine ID

```
SWITCH/>security switch snmp trap probe security engine id disable
```

Console: Security Switch SNMP Trap Security Engine ID	
Description	Set or show SNMP trap security engine ID.
Syntax	`security switch snmp trap security engine id` ***[<engineid>]***
Parameters	***<engineid>***: Engine ID, the format may not be all zeros or all 'ff'H and is restricted to 5 - 32 octet string
Default Setting	Enable

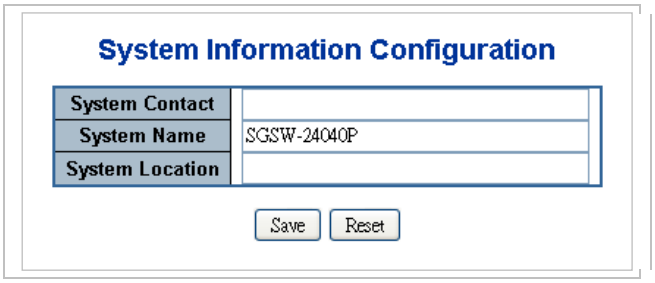
Example:

Set the SNMP trap security engine ID

```
SWITCH/>security switch snmp trap security engine id 800007e5017f000011
```

4.2.3 SNMP System Information Configuration

The switch system information is provided here.

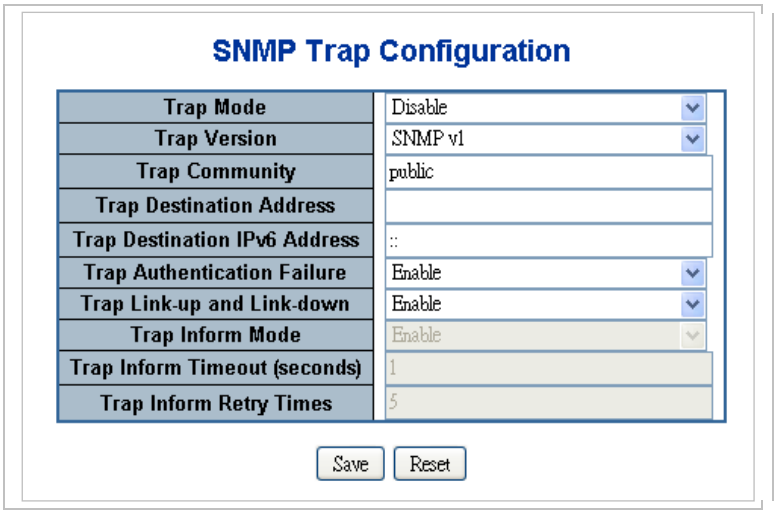


The page includes the following fields:

Object	Description
System Contact	The textual identification of the contact person for this managed node together with information on how to contact this person. The allowed string length is 0 to 255, and the allowed content is the ASCII characters from 32 to 126.
System Name	An administratively assigned name for this managed node. No space characters are permitted. The first character must be alphanumeric. The last character must not be a minus sign. The allowed string length is 0 to 255.
System Location	The physical location of this node (e.g., telephone closet, 3rd floor). The allowed string length is 0 to 255, and the allowed content is the ASCII characters from 32 to 126.

4.2.4 SNMP Trap Configuration

Configure SNMP trap.



The page includes the following fields:

Object	Description
Trap Mode	Indicates the SNMP trap mode operation. Possible modes are: • **Enabled** • **Disabled**
Trap Version	Indicates the SNMP trap supported version. Possible versions are: • **SNMP v1** • **SNMP v2c** • **SNMP v3**
Trap Community	Indicates the community access string when send SNMP trap packet. The allowed string length is 0 to 255, and the allowed content is the ASCII characters from 33 to 126.
Trap Destination Address	Indicates the SNMP trap destination address.
Trap Destination IPv6 Address	Provide the trap destination IPv6 address of this switch.
Trap Authentication Failure	Indicates the SNMP entity is permitted to generate authentication failure traps. Possible modes are: • **Enabled** • **Disabled**
Trap Link-up and Link-down	Indicates the SNMP trap link-up and link-down mode operation. Possible modes are: • **Enabled** • **Disabled**
Trap Inform Mode	Indicates the SNMP trap inform mode operation. Possible modes are: • **Enabled** • **Disabled**
Trap Inform Timeout (seconds)	Indicates the SNMP trap inform timeout. The allowed range is ***0*** to ***2147***.
Trap Inform Retry Times	Indicates the SNMP trap inform retry times. The allowed range is ***0*** to ***255***.

Console: Security Switch SNMP Trap Mode	
Description	Set or show the SNMP trap mode.
Syntax	`security switch snmp trap mode` **`[enable|disable]`**
Parameters	**enable** : Enable SNMP traps **disable**: Disable SNMP traps (default: Show SNMP trap mode)
Default Setting	disable

Example:

Enable SNMP trap mode.

```
SWITCH/>security switch snmp trap mode enable
```

Console: Security Switch SNMP Trap Version	
Description	Set or show the SNMP trap protocol version.
Syntax	`security switch snmp trap version` **`[1|2c|3]`**
Parameters	**1** : SNMP version 1 **2c**: SNMP version 2c **3** : SNMP version 3 (default: Show SNMP trap version)
Default Setting	1

Example:

Set SNMP trap version in version 2c.

```
SWITCH/>security switch snmp trap version 2c
```

Console: Security Switch SNMP Trap Community	
Description	Set or show the community string for SNMP traps.
Syntax	`security switch snmp trap community` ***[<community>]***
Parameters	***<community>***: Community string. Use 'clear' or "" to clear the string (default: Show SNMP trap community)
Default Setting	public

Example:

Set private value for SNMP trap community.

```
SWITCH/>security switch snmp trap community private
```

Console: Security Switch SNMP Trap Destination	
Description	Set or Show the SNMP trap destination address.
Syntax	`security switch snmp trap destination` ***[<ip_addr_string>]***
Parameters	***<ip_addr_string>***: IP host address (a.b.c.d) or a host name string

Example:

Set SNMP trap destination address for 192.168.0.20

```
SWITCH/>security switch snmp trap destination 192.168.0.20
```

Console: Security Switch SNMP Trap IPv6 Destination	
Description	Set or Show the SNMP trap destination IPv6 address.
Syntax	`security switch snmp trap ipv6 destination` ***[<ipv6_addr>]***
Parameters	***<ipv6_addr>***: End IPv6 address. See the glossary for more details about IPv6.
Default Setting	private

Example:

Set SNMP trap IPv6 destination address for 2001::0001

```
SWITCH/>security switch snmp trap ipv6 destination 2001::0001
```

Console: Security Switch SNMP Trap Authentication Failure	
Description	Set or show the SNMP authentication failure trap mode.
Syntax	`security switch snmp trap authentication failure` **[enable|disable]**
Parameters	**enable** : Enable SNMP trap authentication failure **disable**: Disable SNMP trap authentication failure (default: Show SNMP trap authentication failure mode)
Default Setting	enable

Example:

Disable SNMP trap authentication failure

```
SWITCH/>security switch snmp trap authentication failure disable
```

Console: Security Switch SNMP Trap Link-up	
Description	Set or show the port link-up and link-down trap mode.
Syntax	`security switch snmp trap link-up` **[enable|disable]**
Parameters	**enable** : Enable SNMP trap link-up and link-down **disable**: Disable SNMP trap link-up and link-down (default: Show SNMP trap link-up and link-down mode)
Default Setting	enable

Example:

Disable SNMP trap link-up

```
SWITCH/>security switch snmp trap link-up disable
```

Console: Security Switch SNMP Trap Inform Mode	
Description	Set or show the SNMP trap inform mode.
Syntax	`security switch snmp trap inform mode` **[enable|disable]**
Parameters	**enable** : Enable SNMP trap inform **disable**: Disable SNMP trap inform (default: Show SNMP inform mode)
Default Setting	enable

Example:

Disable SNMP trap inform mode.

```
SWITCH/>security switch snmp trap inform mode disable
```

Console: Security Switch SNMP Trap Inform Timeout	
Description	Set or show the SNMP trap inform timeout (usecs).
Syntax	`security switch snmp trap inform timeout` ***[<timeout>]***
Parameters	***<timeout>***: SNMP trap inform timeout (0-2147 seconds) (default: Show SNMP trap inform timeout)
Default Setting	1

Example:

Set SNMP trap inform timeout in 20sec.

```
SWITCH/>security switch snmp trap inform timeout 20
```

Console: Security Switch SNMP Trap Inform Retry Times	
Description	Set or show the SNMP trap inform retry times.
Syntax	`security switch snmp trap inform retry times` ***[<retries>]***
Parameters	***<retries>***: SNMP trap inform retransmitted times (0-255) (default: Show SNMP trap inform retry times)
Default Setting	5

Example:

Set SNMP trap inform retry times in 10.

```
SWITCH/>security switch snmp trap inform retry times 10
```

Console: Security Switch SNMP Trap Security Name	
Description	Set or show SNMP trap security name.
Syntax	`security switch snmp trap security name` ***[<security_name>]***
Parameters	***<security_name>***: A string representing the security name for a principal (default: Show SNMP trap security name)

Example:

Set the SNMP trap security name

```
SWITCH/>security switch snmp trap security name 12345678
```

4.2.5 SNMPv3 Configuration

4.2.5.1 Communities Configuration

Configure the SNMPv3 communities table. The entry index key is Community.

The page includes the following fields:

Object	Description
Delete	Check to delete the entry. It will be deleted during the next save.
Community	Indicates the community access string to permit access to SNMPv3 agent. The allowed string length is 1 to 32, and the allowed content is the ASCII characters from 33 to 126.
Source IP	Indicates the SNMP access source address.
Source Mask	Indicates the SNMP access source address mask.

Buttons

: Click to add a new community entry.

Console: Security Switch SNMP Community Add	
Description	Add or modify SNMPv3 community entry. The entry index key is ***<community>***.
Syntax	`security switch snmp community add` ***<community> [<ip_addr>] [<ip_mask>]***
Parameters	***<community>***: Community string ***<ip_addr>***: IP address (a.b.c.d), default: Show IP address ***<ip_mask>***: IP subnet mask (a.b.c.d), default: Show IP mask

Example:

Add SNMPv3 community entry.

```
SWITCH/>security switch snmp community add public 192.168.0.20 255.255.255.0
```

Console: Security Switch SNMP Community Delete	
Description	Delete SNMPv3 community entry.
Syntax	`security switch snmp community delete` ***<index>***
Parameters	***<index>***: entry index (1-64)
Default Setting	5

Example:

Delete SNMPv3 community entry

```
SWITCH/>security switch snmp community delete 3
```

Console: Security Switch SNMP Community Delete	
Description	Lookup SNMPv3 community entry.
Syntax	`security switch snmp community lookup` ***[<index>]***
Parameters	***<index>***: entry index (1-64)

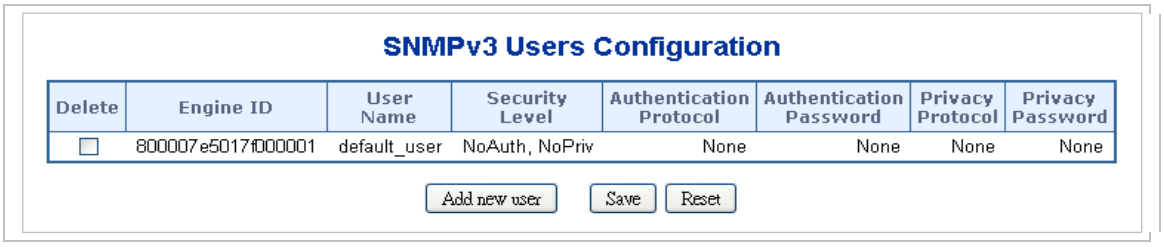
Example:

Lookup SNMPv3 community entry

```
SWITCH/>security switch snmp community lookup
Idx Community                    Source IP        Source Mask
--- ------------------------------  ---------------  ---------------
1   public                        192.168.0.20    255.255.255.0
2   private                       0.0.0.0         0.0.0.0

Number of entries: 2
```

4.2.5.2 Users Configuration

Configure SNMPv3 users table. The entry index keys are Engine ID and User Name.



The page includes the following fields:

Object	Description
Delete	Check to delete the entry. It will be deleted during the next save.
Engine ID	A octet string identifying the engine ID that this entry should belong to. The string must contain an even number between 10 and 64 hexadecimal digits, but all-zeros and all-'F's are not allowed.
User Name	A string identifying the user name that this entry should belong to. The allowed string length is 1 to 32, and the allowed content is the ASCII characters from 33 to 126.

Security Level	Indicates the security model that this entry should belong to. Possible security models are: • **NoAuth, NoPriv**: No authentication and no privacy. • **Auth, NoPriv**: Authentication and no privacy. • **Auth, Priv**: Authentication and privacy. • The value of security level cannot be modified if entry already exists. Ensure that the value is set correctly.
Authentication Protocol	Indicates the authentication protocol that this entry should belong to. Possible authentication protocols are: • **None**: No authentication protocol. • **MD5**: An optional flag to indicate that this user is using the MD5 authentication protocol. • **SHA**: An optional flag to indicate that this user is using the SHA authentication protocol. • The value of security level cannot be modified if entry already exists. Ensure that the value is set correctly.
Authentication Password	A string identifying the authentication pass phrase. For MD5 authentication protocol, the allowed string length is 8 to 32. For SHA authentication protocol, the allowed string length is 8 to 40. The allowed content is the ASCII characters from 33 to 126.
Privacy Protocol	Indicates the privacy protocol that this entry should belong to. Possible privacy protocols are: • **None**: None privacy protocol. • **DES**: An optional flag to indicate that this user is using the DES authentication protocol.
Privacy Password	A string identifying the privacy pass phrase. The allowed string length is 8 to 32, and the allowed content is the ASCII characters from 33 to 126.

Buttons

Add new user: Click to add a new user entry.

Console: Security Switch SNMP User Add	
Description	Add SNMPv3 user entry. The entry index keys are ***<engineid>*** and ***<user_name>***. Modification of the keys is disallowed.
Syntax	`security switch snmp user add` ***<engineid> <user_name>*** **[md5|sha]** ***[<auth_password>]*** **[des]** ***[<priv_password>]***
Parameters	***<engineid>***: Engine ID, the format may not be all zeros or all 'ff'H and is restricted to 5 - 32 octet string ***<user_name>***: A string identifying the user name that this entry should belong to **md5**: An optional flag to indicate that this user using MD5 authentication protocol **sha**: An optional flag to indicate that this user using SHA authentication protocol ***<auth_password>***: A string identifying the authentication pass phrase **des**: An optional flag to indicate that this user using DES privacy protocol privacy protocol should belong to ***<priv_password>***: A string identifying the privacy pass phrase

Example:

Add SNMPv3 user entry

```
SWITCH/>security switch snmp user add 800007e5017f000003 admin snmpv3 md5
12345678 des abcdefgh
```

Console: Security Switch SNMP User Delete	
Description	Delete SNMPv3 user entry.
Syntax	`security switch snmp user delete` ***<index>***
Parameters	***<index>***: entry index (1-64)

Example:

Delete SNMPv3 user entry

```
SWITCH/>security switch snmp user delete 1
```

Console: Security Switch SNMP User Changekey	
Description	Change SNMPv3 user password.
Syntax	`security switch snmp user changekey` ***<engineid> <user_name> <auth_password> [<priv_password>]***
Parameters	***<engineid>***: Engine ID, the format may not be all zeros or all 'ff'H and is restricted to 5 – 32 octet string ***<user_name>***: A string identifying the user name that this entry should belong to ***<auth_password>***: A string identifying the authentication pass phrase ***<priv_password>***: A string identifying the privacy pass phrase

Example:

Delete SNMPv3 user entry

```
SWITCH/>security switch snmp user changekey 800007e5017f000003 admin snmpv3
87654321 12345678
```

Console: Security Switch SNMP Community Lookup	
Description	Lookup SNMPv3 user entry.
Syntax	`security switch snmp user lookup` ***[<index>]***
Parameters	***<index>***: entry index (1-64)

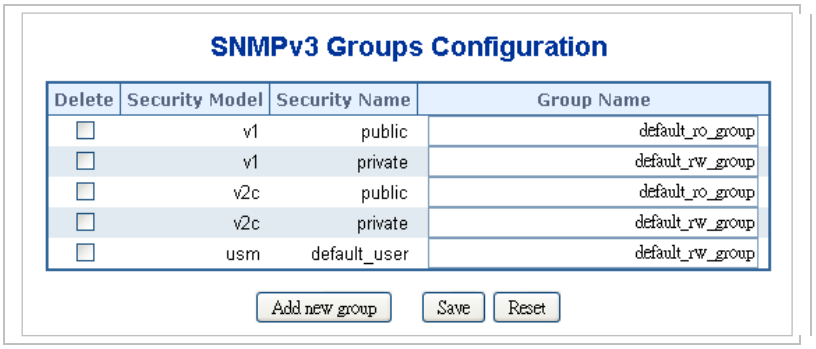
Example:

Lookup SNMPv3 user entry

```
SWITCH/>security switch snmp user lookup
Idx Engine ID   User Name                       Level          Auth  Priv
--- ---------   ------------------------------  -------------  ----  ----
1   Remote      admin_snmpv3                    Auth, Priv     MD5   DES

Number of entries: 1
```

4.2.5.3 Groups Configuration

Configure SNMPv3 groups table. The entry index keys are Security Model and Security Name.



The page includes the following fields:

Object	Description

Delete	Check to delete the entry. It will be deleted during the next save.
Security Model	Indicates the security model that this entry should belong to. Possible security models are: • **v1**: Reserved for SNMPv1. • **v2c**: Reserved for SNMPv2c. • **usm**: User-based Security Model (USM).
Security Name	A string identifying the security name that this entry should belong to. The allowed string length is 1 to 32, and the allowed content is the ASCII characters from 33 to 126.
Group Name	A string identifying the group name that this entry should belong to. The allowed string length is 1 to 32, and the allowed content is the ASCII characters from 33 to 126.

Buttons

: Click to add a new group entry.

Console: Security Switch SNMP Group Add	
Description	Add or modify SNMPv3 group entry. The entry index keys are ***<security_model>*** and ***<security_name>***.
Syntax	`security switch snmp group add` ***<security_model> <security_name> <group_name>***
Parameters	***<security_model>***: v1 - Reserved for SNMPv1 v2c - Reserved for SNMPv2c usm - User-based Security Model (USM) ***<security_name>***: A string identifying the security name that this entry should belong to ***<group_name>***: A string identifying the group name that this entry should belong to

Example:

Add SNMPv3 group entry

```
SWITCH/>security switch snmp group add usm admin_snmpv3 group_snmpv3
```

Console: Security Switch SNMP Group Delete	
Description	Delete SNMPv3 group entry.
Syntax	`security switch snmp group delete` ***<index>***
Parameters	***<index>***: entry index (1-64)

Example:

Delete SNMPv3 group entry

```
SWITCH/>security switch snmp group delete 1
```

Console: Security Switch SNMP Group Lookup	
Description	Lookup SNMPv3 group entry.
Syntax	`security switch snmp group lookup` ***[<index>]***
Parameters	***<index>***: entry index (1-64)

Example:

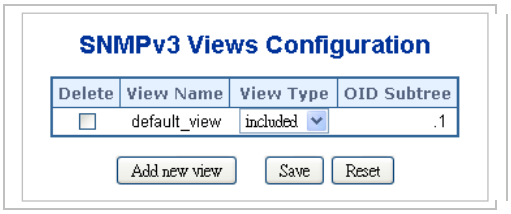
Lookup SNMPv3 group entry

```
SWITCH/>security switch snmp group lookup
Idx  Model  Security Name                  Group Name
---  -----  ----------------------------  --------------------------------
2    v1     private                       default_rw_group
3    v2c    public                        default_ro_group
```

```
4    v2c    private                          default rw group
5    usm    default_user                     default_rw_group

Number of entries: 4
```

4.2.5.4 Views Configuration

Configure SNMPv3 views table. The entry index keys are View Name and OID Subtree. The SNMPv3 Views



The page includes the following fields:

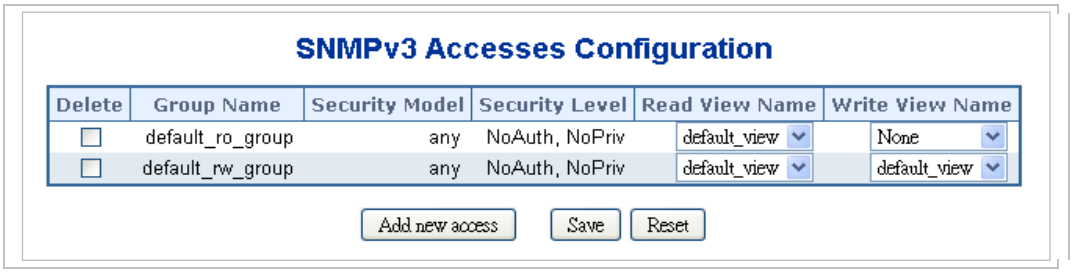
Object	Description
Delete	Check to delete the entry. It will be deleted during the next save.
View Name	A string identifying the view name that this entry should belong to. The allowed string length is 1 to 32, and the allowed content is the ASCII characters from 33 to 126.
View Type	Indicates the view type that this entry should belong to. Possible view types are: • **Included**: An optional flag to indicate that this view subtree should be included. • **Excluded**: An optional flag to indicate that this view subtree should be excluded. In general, if a view entry's view type is 'excluded', another view entry should exist where the view type is 'included' and its OID subtree oversteps the 'excluded' view entry.
OID Subtree	The OID defining the root of the subtree to add to the named view. The allowed OID length is 1 to 128. The allowed string content is digital number or asterisk(*).

Buttons

: Click to add a new view entry.

4.2.5.5 SNMPv3 Accesses Configuration

Configure SNMPv3 access table. The entry index keys are Group Name, Security Model and Security Level.



The page includes the following fields:

Object	Description
Delete	Check to delete the entry. It will be deleted during the next save.
Group Name	A string identifying the group name that this entry should belong to. The allowed string length is 1 to 32, and the allowed content is the ASCII characters from 33 to 126.
Security Model	Indicates the security model that this entry should belong to. Possible security models are: • **any**: Accepted any security model (v1|v2c|usm). • **v1**: Reserved for SNMPv1. • **v2c**: Reserved for SNMPv2c. • **usm**: User-based Security Model (USM)
Security Level	Indicates the security model that this entry should belong to. Possible security models are: • **NoAuth, NoPriv**: No authentication and no privacy. • **Auth, NoPriv**: Authentication and no privacy. • **Auth, Priv**: Authentication and privacy.
Read View Name	The name of the view defining the MIB objects for which the current values may be requested. The allowed string length is 1 to 32, and the allowed content is the ASCII characters from 33 to 126.
Write View Name	The name of the view defining the MIB objects for which this request may potentially SET new values. The allowed string length is 1 to 32, and the allowed content is the ASCII characters from 33 to 126.

Buttons

: Click to add a new access entry.

Console: Security Switch SNMP Engine ID	
Description	Set or show SNMPv3 local engine ID.
Syntax	`security switch snmp engine id` ***[<engineid>]***
Parameters	***<engineid>***: Engine ID, the format may not be all zeros or all 'ff'H and is restricted to 5 - 32 octet string
Default Setting	800007e5017f000001

Example:

Set 800007e5017f000002 for SNMPv3 local engine ID

```
SWITCH/>security switch snmp engine id 800007e5017f000002
```

Console: Security Switch SNMP Access Delete	
Description	Add or modify SNMPv3 access entry. The entry index keys are ***<group_name>***, ***<security_model>*** and ***<security_level>***.
Syntax	`security switch snmp access add` ***<group_name> <security_model> <security_level> [<read_view_name>] [<write_view_name>]***
Parameters	***<group_name>***: A string identifying the group name that this entry should belong to ***<security_model>***: any - any security model (v1|v2c|usm), v1 - Reserved for SNMPv1, v2c - Reserved forSNMPv2c, usm - User-based Security Model (USM) ***<security_level>***: noAuthNoPriv - No authentication or privacy**,** AuthNoPriv - Authentication and none privacy, AuthPriv - Authentication and privacy ***<read_view_name>***: The name of the MIB view defining the MIB objects for which this request may request the current values ***<write_view_name>***: The name of the MIB view defining the MIB objects for which this request may potentially SET new values

Example:

Add SNMPv3 access entry

```
SWITCH/>security switch snmp access add group snmpv3 usm authpriv snmpv3 view
snmpv3_view
```

Console: Security Switch SNMP Access Delete	
Description	Delete SNMPv3 access entry.
Syntax	`security switch snmp access delete` ***<index>***
Parameters	***<index>***: entry index (1-64)

Example:

Delete SNMPv3 access entry

```
SWITCH/>security switch snmp access delete 3
```

Console: Security Switch SNMP Access Lookup	
Description	Lookup SNMPv3 access entry.
Syntax	`security switch snmp access lookup` ***[<index>]***
Parameters	***<index>***: entry index (1-64)

Example:

Lookup SNMPv3 access entry

```
SWITCH/>security switch snmp access lookup
Idx Group Name                      Model Level
--- ------------------------------  ----- --------------
1   default ro group                any   NoAuth, NoPriv
2   default_rw_group                any   NoAuth, NoPriv

Number of entries: 2
```

Console: Security Switch SNMP View Add	
Description	Add or modify SNMPv3 view entry. The entry index key are ***<view_name>*** and ***<oid_subtree>***.
Syntax	`security switch snmp view add` ***<view_name>*** **[included|excluded]** ***<oid_subtree>***
Parameters	***<view_name>***: A string identifying the view name that this entry should belong to **included**: An optional flag to indicate that this view subtree should included **excluded**: An optional flag to indicate that this view subtree should excluded ***<oid_subtree>***: The OID defining the root of the subtree to add to the named view

Example:

Add SNMPv3 view entry

```
SWITCH/>security switch snmp view add snmpv3_view include .1
```

Console: Security Switch SNMP View Delete	
Description	Delete SNMPv3 view entry.
Syntax	`security switch snmp view delete` ***<index>***
Parameters	***<index>***: entry index (1-64)

Example:

Delete SNMPv3 view entry

```
SWITCH/>security switch snmp view delete 3
```

Console: Security Switch SNMP View Lookup	
Description	Lookup SNMPv3 view entry.

Syntax	`security switch snmp view lookup` ***[<index>]***
Parameters	***<index>***: entry index (1-64)

Example:

Lookup SNMPv3 view entry

```
SWITCH/>security switch snmp view lookup
Idx  View Name                        View Type  OID Subtree
---  -------------------------------  ---------  --------------------------
1    default view                     included   .1
2    snmpv3 viwe                      included   .1

Number of entries: 2
```

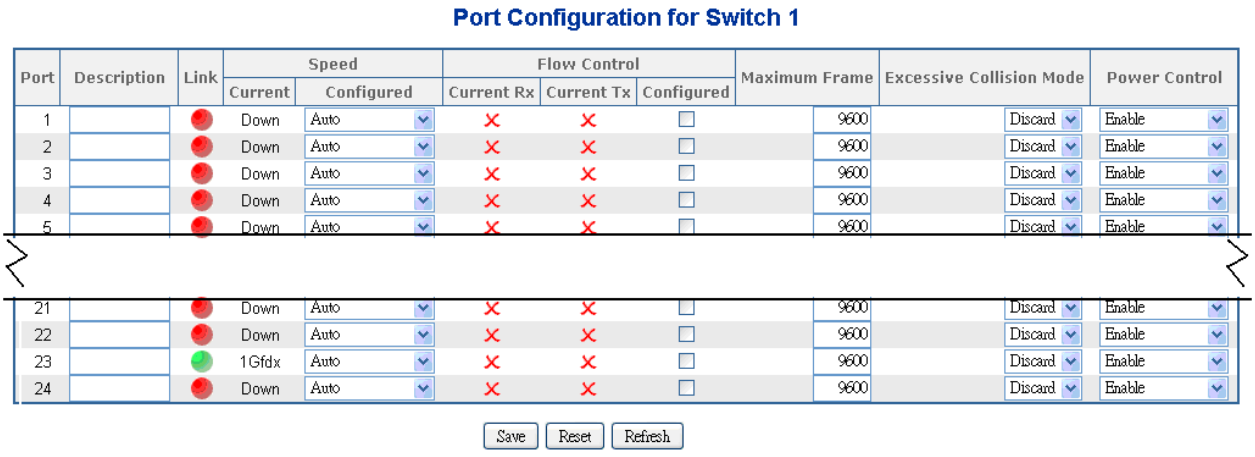
4.3 Port Management

Use the Port menu to display or configure the Managed Switch's ports. This section has the following items:

- **Port Configuration:** Configures port connection settings
- **Port Statistics Overview:** Lists a basic overview of Ethernet and RMON port statistics
- **Port Statistics Detail:** Lists Ethernet and RMON port statistics in a greater detail
- **SFP Module Information:** Display SFP information
- **Port Mirror:** Sets the source and target ports for mirroring

4.3.1 Port Configuration

Configure or display the current port configuration. The port settings relate to the currently selected stack unit. The table has one row for each port on the selected switch in the stack and a number of columns.



The page includes the following fields:

Object	Description
Port	The logical port number for this row.
Description	Indicates the per port description.
Link	The current link state is displayed graphically. Green indicates the link is up and red that it is down.

Current Link Speed	Provides the current link speed of the port.
Configured Link Speed	Select any available link speed for the given switch port. Draw the menu bar to select the mode. • **Auto Speed** - Setup Auto negotiation. • **10 Half** - Force sets 10Mbps/Half-Duplex mode. • **10 Full** - Force sets 10Mbps/Full-Duplex mode. • **100 Half** - Force sets 100Mbps/Half-Duplex mode. • **100 Full** - Force sets 100Mbps/Full-Duplex mode. • **1000 Full** - Force sets 10000Mbps/Full-Duplex mode. • **Disable** - Shutdown the port manually.
Flow Control	Auto Speed indicates the flow control capability that is advertised to the link partner. • When a fixed-speed setting is specified, that speed will be advertised • Current Rx column indicates whether pause frames on the port are obeyed. • Current Tx column indicates whether pause frames on the port are transmitted. • The Rx and Tx settings are determined by the result of the last Auto-Negotiation. • Check the configured column to use flow control. • This setting is related to the setting for Configured Link Speed.
Maximum Frame	Enter the maximum frame size allowed for the switch port, including FCS. The allowed range is 1518 bytes to 9600 bytes.
Excessive Collision Mode	Configure port transmit collision behaviour. • **Discard**: Discard frame after 16 collisions (default). • **Restart**: Restart back off algorithm after 16 collisions.
Power Control	The Usage column shows the current percentage of the power consumption per port. The Configured column allows for changing the power savings mode parameters per port. • **Disabled**: All power savings mechanisms disabled. • **ActiPHY**: Link down power savings enabled. • **Dynamic**: Link up power savings enabled. • **Enabled**: Link up and link down power savings enabled.

When set each port to run at 100M Full, 100M Half, 10M Full, and 10M Half-speed modes. The Auto-MDIX function will be disabled.

Console: Port Configuration	
Description	Show port configuration.
Syntax	`port configuration` ***[<port_list>]*** **[up|down]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **up**: Show ports, which are up **down:** Show ports, which are down (default: Show all ports)

Example:

Display port1~4 status

```
SWITCH/>port configuration 1-4

Port Configuration:
===================


Port  State     Mode    Flow Control  MaxFrame  Power    Excessive  Link
----  --------  ------  ------------  --------  ------   ---------  ----
1     Enabled   Auto    Disabled      9600      Enabled   Discard   Down
2     Enabled   Auto    Disabled      9600      Enabled   Discard   Down
3     Enabled   Auto    Disabled      9600      Enabled   Discard   Down
4     Enabled   Auto    Disabled      9600      Enabled   Discard   Down
```

Console: Port Mode	
Description	Set or show the port speed and duplex mode.
Syntax	`port mode` ***[<port_list>]*** **[10hdx|10fdx|100hdx|100fdx|1000fdx|auto]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **10hdx**: 10 Mbps, half duplex **10fdx**: 10 Mbps, full duplex **100hdx**: 100 Mbps, half duplex **100fdx**: 100 Mbps, full duplex **1000fdx**: 1 Gbps, full duplex **auto**: Auto negotiation of speed and duplex (default: Show configured and current mode)
Default Setting	Auto

Example:

Set 10Mbps (half duplex) speed for port1

```
SWITCH/>port mode 1 10hdx
```

Console: Port Flow Control	
Description	Set or show the port flow control mode.
Syntax	`port flow control` ***[<port_list>]*** **[enable|disable]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable** : Enable flow control **disable** : Disable flow control (default: Show flow control mode)
Default Setting	Disable

Example:

Enable flow control function for port1

```
SWITCH/>port flow control 1 enable
```

Console: Port State	
Description	Set or show the port administrative state.
Syntax	`port state` ***[<port_list>]*** **[enable|disable]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable port **disable**: Disable port (default: Show administrative mode)
Default Setting	Enable

Example:

Disable port1

```
SWITCH/>port state 1 disable
```

Console: Port Maximum Frame	
Description	Set or show the port maximum frame size.
Syntax	`port maxframe` ***[<port_list>] [<max_frame>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports ***<max_frame>***: Port maximum frame size (1518-9600), default: Show maximum frame size
Default Setting	9600

Example:

Set 2048 frame size for port1

```
SWITCH/>port maxframe 1 2048
```

Console: Port Power	
Description	Set or show the port PHY power mode.
Syntax	`port power [<port_list>] [enable|disable|actiphy|dynamic]`
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable all power control **disable**: Disable all power control **actiphy**: Enable ActiPHY power control **dynamic**: Enable Dynamic power control
Default Setting	Enable

Example:

Disable port power function for port1-4

```
SWITCH/>port power 1-4 disable
```

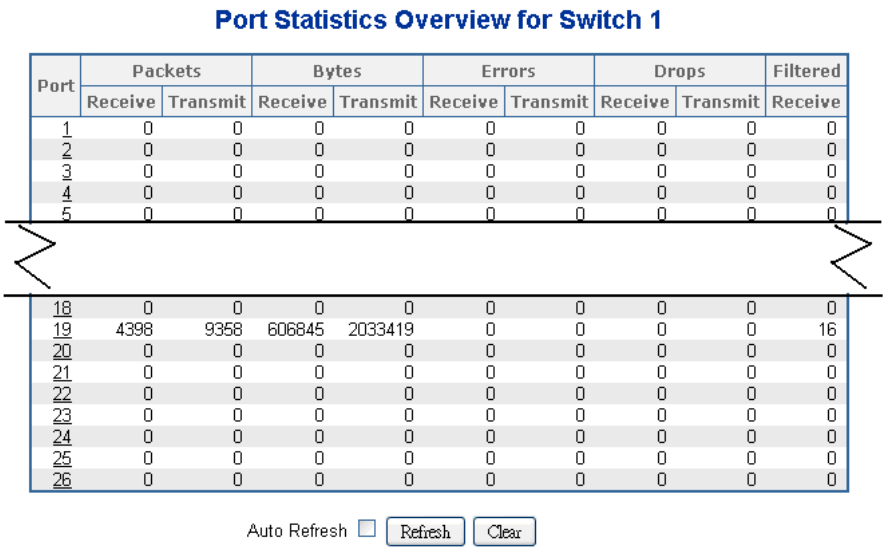
Console: Port Excessive	
Description	Set or show the port excessive collision mode.
Syntax	`port excessive [<port_list>] [discard|restart]`
Parameters	***<port_list>***: Port list or 'all', default: All ports **discard**: Discard frame after 16 collisions **restart** : Restart backoff algorithm after 16 collisions (default: Show mode)
Default Setting	Discard

Example:

```
SWITCH/>port excessive 1 restart
```

4.3.2 Port Statistics Overview

The overview provides general traffic statistics for all switch ports. The ports belong to the currently selected stack unit.



Port Statistics Overview for Switch 1

Port	Packets		Bytes		Errors		Drops		Filtered
	Receive	Transmit	Receive	Transmit	Receive	Transmit	Receive	Transmit	Receive
1	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0
19	4398	9358	606845	2033419	0	0	0	0	16
20	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0

Auto Refresh ☐ Refresh Clear

The displayed counters are:

Object	Description
Port	The logical port for the settings contained in the same row.
Packets	The number of received and transmitted packets per port.
Bytes	The number of received and transmitted bytes per port.
Errors	The number of frames received in error and the number of incomplete transmissions per port.
Drops	The number of frames discarded due to ingress or egress congestion.
Filtered	The number of received frames filtered by the forwarding process.

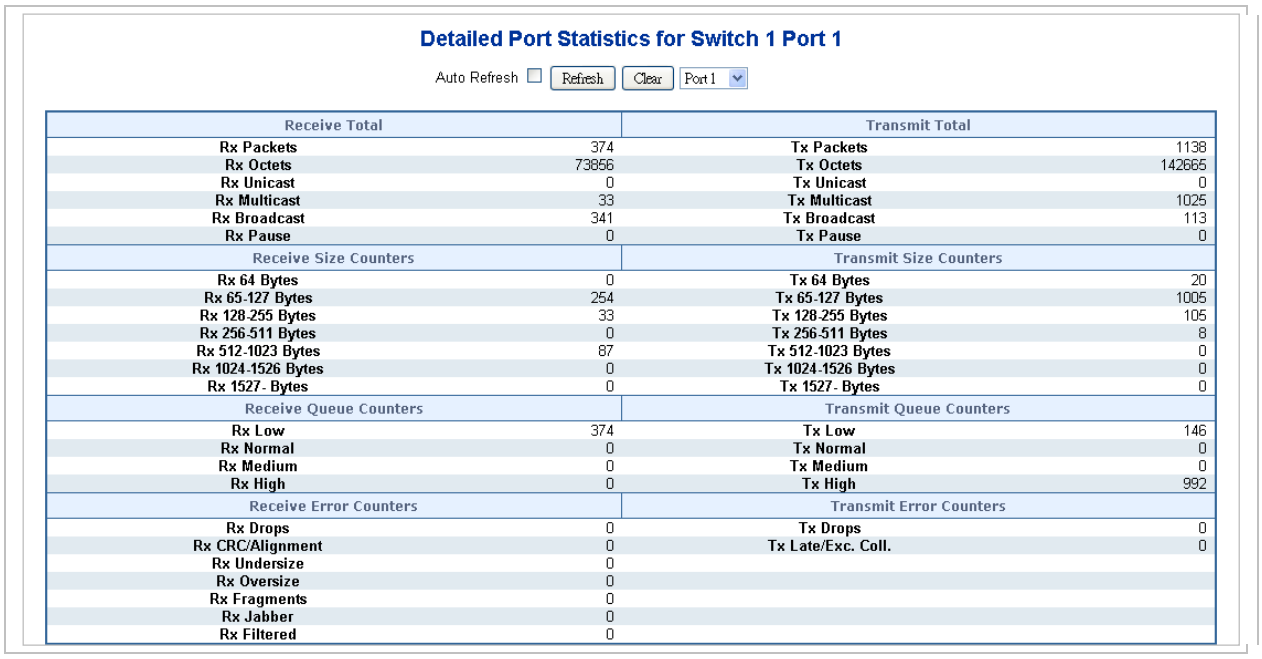
Buttons

: Clears the counters for all ports.

Console: Port Statistics	
Description	Show port statistics.
Syntax	`port statistics [<port_list>] [<command>] [up|down]`
Parameters	***<port_list>***: Port list or 'all', default: All ports ***<command>***: The command parameter takes the following values: **clear**: Clear port statistics **packets**: Show packet statistics **bytes**: Show byte statistics **errors**: Show error statistics **discards**: Show discard statistics **filtered**: Show filtered statistics **low**: Show low priority statistics **normal**: Show normal priority statistics **medium**: Show medium priority statistics **high**: Show high priority statistics (default: Show all port statistics) **up**: Show ports, which are up **down**: Show ports, which are down (default: Show all ports)

4.3.3 Port Statistics Detail

Provides detailed traffic statistics for a specific switch port. On the webpage, use the port select box to select which switch port details to display. The selected port belongs to the currently selected stack unit. The displayed counters are the totals for receive and transmit, the size counters for receive and transmit, and the error counters for receive and transmit.



Detailed Port Statistics for Switch 1 Port 1

Auto Refresh ☐ Refresh Clear Port 1

Receive Total		Transmit Total	
Rx Packets	374	Tx Packets	1138
Rx Octets	73856	Tx Octets	142665
Rx Unicast	0	Tx Unicast	0
Rx Multicast	33	Tx Multicast	1025
Rx Broadcast	341	Tx Broadcast	113
Rx Pause	0	Tx Pause	0
Receive Size Counters		**Transmit Size Counters**	
Rx 64 Bytes	0	Tx 64 Bytes	20
Rx 65-127 Bytes	254	Tx 65-127 Bytes	1005
Rx 128-255 Bytes	33	Tx 128-255 Bytes	105
Rx 256-511 Bytes	0	Tx 256-511 Bytes	8
Rx 512-1023 Bytes	87	Tx 512-1023 Bytes	0
Rx 1024-1526 Bytes	0	Tx 1024-1526 Bytes	0
Rx 1527- Bytes	0	Tx 1527- Bytes	0
Receive Queue Counters		**Transmit Queue Counters**	
Rx Low	374	Tx Low	146
Rx Normal	0	Tx Normal	0
Rx Medium	0	Tx Medium	0
Rx High	0	Tx High	992
Receive Error Counters		**Transmit Error Counters**	
Rx Drops	0	Tx Drops	0
Rx CRC/Alignment	0	Tx Late/Exc. Coll.	0
Rx Undersize	0		
Rx Oversize	0		
Rx Fragments	0		
Rx Jabber	0		
Rx Filtered	0		

The page includes the following fields:

- **Receive Total and Transmit Total**

Object	Description
Rx and Tx Packets	The number of received and transmitted (good and bad) packets
Rx and Tx Octets	The number of received and transmitted (good and bad) bytes. Includes FCS, but excludes framing bits.
Rx and Tx Unicast	The number of received and transmitted (good and bad) unicast packets.
Rx and Tx Multicast	The number of received and transmitted (good and bad) multicast packets.
Rx and Tx Broadcast	The number of received and transmitted (good and bad) broadcast packets.
Rx and Tx Pause	A count of the MAC Control frames received or transmitted on this port that have an opcode indicating a PAUSE operation.

- **Receive and Transmit Size Counters**

The number of received and transmitted packets split into categories based on their respective frame sizes.

- **Receive and Transmit Queue Counters**

These tables indicate the number of received and transmitted packets per input and output queue.

- **Receive Error Counters**

Object	Description
Rx Drops	The number of frames dropped due to lack of receive buffers or egress congestion.
Rx CRC/Alignment	The number of frames received with CRC or alignment errors.
Rx Undersize	The number of short 1 frames received with valid CRC.
Rx Oversize	The number of long 2 frames received with valid CRC.
Rx Fragments	The number of short 1 frames received with invalid CRC.
Rx Jabber	The number of long 2 frames received with invalid CRC.
Rx Filtered	The number of received frames filtered by the forwarding process. • Short frames are frames that are smaller than 64 bytes.

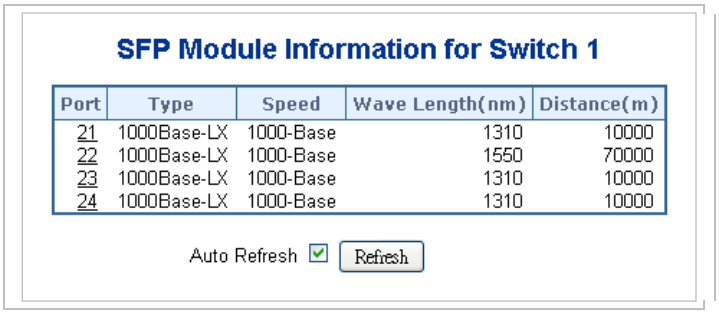
	• Long frames are frames that are longer than the configured maximum frame length for this port.

➢ **Transmit Error Counters**

Object	Description
Tx Drops	The number of frames dropped due to output buffer congestion.
Tx Late/Exc. Coll.	The number of frames dropped due to excessive or late collisions.

4.3.4 SFP Module Information

Check the physical or operational status of an SFP module. The webpage shows the operational status, such as the transceiver type, speed, wavelength and support distances of SFP modules on a specific interface. The port number hyperlink can also be used to check the statistics of a specific interface.


SFP Module Information for Switch 1
Port Type Speed Wave Length(nm) Distance(m)
21 1000Base-LX 1000-Base 1310 10000
22 1000Base-LX 1000-Base 1550 70000
23 1000Base-LX 1000-Base 1310 10000
24 1000Base-LX 1000-Base 1310 10000
Auto Refresh
Refresh

The page includes the following fields:

Object	Description
Type	Display the type of current SFP module, the possible types are: • 1000Base-SX • 1000Base-LX • 100Base-FX
Speed	Display the speed of current SFP module, the speed value or description is get from the SFP module. Different vendors SFP modules might shows different speed information.
Wave Length(nm)	Display the wavelength of current SFP module, the wavelength value is get from the SFP module. Use this column to check if the wavelength values of two nodes are the matched while the fibre connection is failed.
Distance(m)	Display the supports distance of current SFP module, the distance value is get from the SFP module.

Console: Port SFP	
Description	Show SFP port information.
Syntax	`port sfp` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports
Default Setting	Enable

Example:

Show SFP information for port21-24

```
SWITCH/>port sfp

Port  Type            Speed      Wave Length(nm)  Distance(m)
----  ------------    ---------  ---------------  -----------
21    1000Base-LX     1000-Base             1310        10000
22    1000Base-LX     1000-Base             1310        10000
```

23	--	--	--	--
24	--	--	--	--

4.3.5 Port Mirroring Configuration

The Port Mirroring function monitors network traffic by forwarding a copy of each incoming or outgoing packet from one port of a network switch to another port where the packet can be studied. To debug network problems, selected traffic can be copied, or mirrored, to a mirror port where a frame analyzer can be attached to analyze the frame flow.

The Managed Switch can unobtrusively mirror traffic from any port to a monitor port. You can then attach a protocol analyzer or RMON probe to this port to perform traffic analysis and verify connection integrity.

The traffic to be copied to the mirror port is selected as follows:

- All frames received on a given port (also known as ingress or source mirroring).
- All frames transmitted on a given port (also known as egress or destination mirroring).

The Port Mirror Configuration screen is shown below

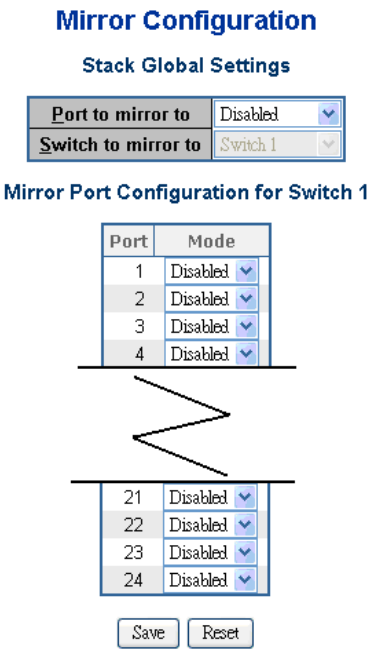


***Figure** – The Mirror Configuration screen with both Global and switch –specific settings*

The page includes the following fields:

Object	Description
Port to mirror to	Frames from ports that have either source or destination mirroring enabled are mirrored to this port. **Disabled** disables mirroring.
Switch to mirror to	Frames from ports that have either source (rx) or destination (tx) mirroring enabled are mirrored to this switch.
Port	The logical port for the settings contained in the same row.

Mode	Select mirror mode. • **Rx only**: Frames received at this port are mirrored to the mirroring port. Frames transmitted are not mirrored. • **Tx only**: Frames transmitted from this port are mirrored to the mirroring port. Frames received are not mirrored. • **Disabled**: Neither frames transmitted nor frames received are mirrored. • **Enabled**: Frames received and frames transmitted are mirrored to the mirror port.

Console: Mirror Configuration	
Description	Show mirror configuration.
Syntax	`mirror configuration` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports
Default Setting	disable

Example:

Show mirror configuration.

```
SWITCH/>mirror configuration
```

Console: Mirror Port	
Description	Set or show the mirror port.
Syntax	`mirror port` **[*<port>*|disable]**
Parameters	***<port>*|disable**: Mirror port or 'disable', default: Show port
Default Setting	Mirror Port: 1

Example:

Set port 2 for the mirror port.

```
SWITCH/>mirror port 2
```

Console: Mirror SID	
Description	Set or show the mirror switch ID.
Syntax	`mirror sid` ***[<sid>]***
Parameters	***<sid>***: Switch ID (1-16)
Default Setting	1

Example:

Set SID2 for mirror switch ID.

```
SWITCH/>mirror sid 2
```

Console: Mirror SID	
Description	Set or show the mirror mode.
Syntax	`mirror mode` ***[<port_list>]*** **[enable|disable|rx|tx]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable** : Enable Rx and Tx mirroring **disable**: Disable Mirroring **rx**: Enable Rx mirroring **tx**: Enable Tx mirroring (default: Show mirror mode)
Default Setting	disable

Example:

Enable the mirror mode for port 1-4.

```
SWITCH/>mirror mode 1-4 enable
```

4.4 Link Aggregation

Port Aggregation optimizes port usage by linking a group of ports together to form a single Link Aggregated Groups (LAGs). The device supports the following Aggregation links:

- **Static LAGs** (**Port Trunk**) – Force aggregated selected ports to be a trunk group.
- **Link Aggregation Control Protocol** (**LACP**) LAGs - LACP LAG negotiate Aggregated Port links with other LACP ports located on a different device. If the other device ports are also LACP ports, the devices establish a LAG between them.

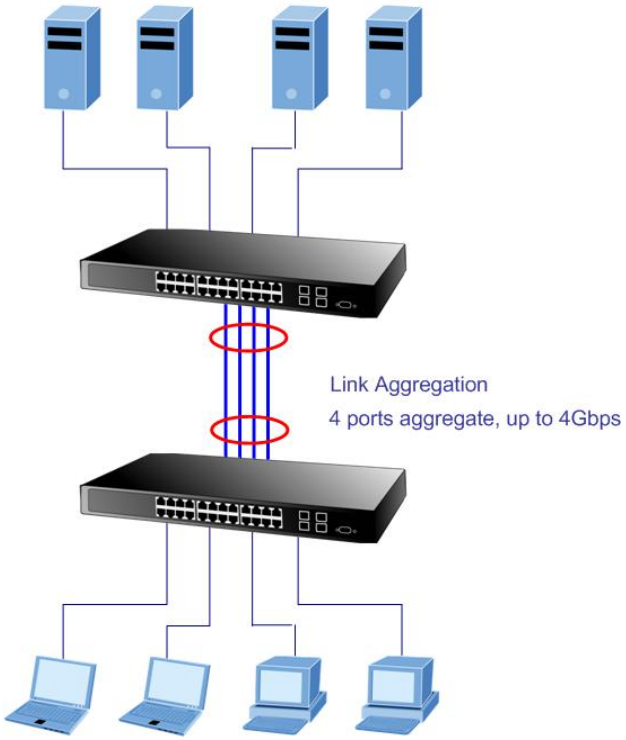


***Figure** – A conceptual Link Aggregation diagram*

Port link aggregations can be used to increase the bandwidth of a network connection or to ensure fault recovery. Up to 4 consecutive ports may be grouped into a single dedicated connection between any two the Switch or other Layer 2 switches. Be sure to specify the link aggregation on the devices at both ends prior to making any physical connections between devices. When using a port link aggregation, keep the following in mind:

- The ports used in a link aggregation must all be of the same media type (RJ-45, 100 Mbps fibre).
- The ports that can be assigned to the same link aggregation have certain other restrictions (see below).
- Ports can only be assigned to one link aggregation.
- The ports at both ends of a connection must be configured as link aggregation ports.
- None of the ports in a link aggregation can be configured as a mirror source port or a mirror target port.
- All of the ports in a link aggregation have to be treated as a whole when moved from/to, added or deleted from a VLAN.
- The Spanning Tree Protocol will treat all the ports in a link aggregation as a whole.

- Enable the link aggregation prior to connecting any cable between the switches to avoid creating a data loop.
- Disconnect all link aggregation port cables or disable the link aggregation ports before removing a port link aggregation to avoid creating a data loop.

A maximum of 16 ports may be aggregated at the same time. The Managed Switch supports Gigabit Ethernet ports (up to 12 groups). If the group is defined as a LACP static link aggregation group, then any extra ports selected are placed in a standby mode for redundancy if one of the other ports fails. If the group is defined as a local static link aggregation group, then the number of ports must be the same as the group member ports.

The aggregation code ensures that frames belonging to the same frame flow (for example, a TCP connection) are always forwarded on the same link aggregation member port. Reordering of frames within a flow is therefore not possible. The aggregation code is based on the following information:

Source MAC

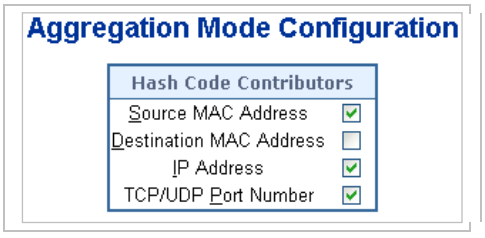
- Destination MAC
- Source and destination IPv4 address.
- Source and destination TCP/UDP ports for IPv4 packets

Normally, all contributions to the aggregation code should be enabled to obtain the best traffic distribution among the link aggregation member ports. Each link aggregation may consist of up to 16 member ports. Any quantity of link aggregation s may be configured for the device (only limited by the quantity of ports on the device.) To configure a proper traffic distribution, the ports within a link aggregation must use the same link speed.

4.4.1 Static Aggregation Configuration

Configure the Aggregation hash mode and the aggregation group. The aggregation hash mode settings are global, whereas the aggregation group settings relate to the currently selected stack unit, as reflected by the page header.

➢ **Hash Code Contributors**



The page includes the following fields:

Object	Description
Source MAC Address	Check to enable the use of the Source MAC address to calculate the destination port for the frame. By default, Source MAC Address is enabled.
Destination MAC Address	Check to enable the use of the Destination MAC Address to calculate the destination port for the frame. By default, Destination MAC Address is disabled.
IP Address	Check to enable the use of the IP Address to calculate the destination port for the frame. By default, IP Address is enabled.

TCP/UDP Port Number	Check to enable the use of the TCP/UDP Port Number to calculate the destination port for the frame. By default, TCP/UDP Port Number is enabled.

Console: Aggregation Configuration	
Description	Show link aggregation configuration.
Syntax	`aggr configuration`

Example:

```
SWITCH/>aggr configuration
Aggregation Mode:

SMAC  : Enabled
DMAC  : Disabled
IP    : Enabled
Port  : Enabled
```

Console: Aggregation Mode	
Description	Set or show the link aggregation traffic distribution mode.
Syntax	`aggr mode` **`[smac|dmac|ip|port] [enable|disable]`**
Parameters	**smac**: Source MAC address **dmac**: Destination MAC address **ip**: Source and destination IP address **port**: Source and destination UDP/TCP port **enable**: Enable field in traffic distribution **disable**: Disable field in traffic distribution
Default Setting	SMAC: Enabled DMAC: Disabled IP: Enabled Port: Enabled

Example:

Disable SMAC mode

```
SWITCH/>Aggr mode smac disable
```

➢ **Static Aggregation Group Configuration**

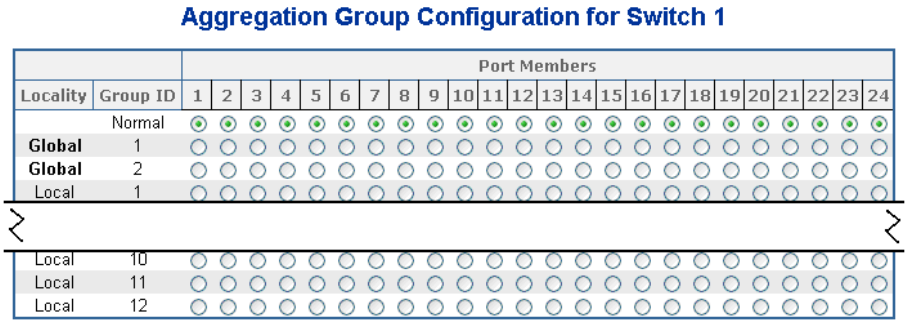

Aggregation Group Configuration for Switch 1
Port Members
Locality
Group ID
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Normal
Global 1
Global 2
Local 1
Local 10
Local 11
Local 12

Figure4-3 *- Aggregation Group Configuration for a single switch*

The page includes the following fields:

Object	Description
Locality	Indicates the aggregation group type. This field is only valid for stackable switches. • **Global**: The group members may reside on different units in the stack. The device supports two 8-port global aggregations. • **Local**: The group members reside on the same unit. Each local aggregation may consist of up to 16 members.

Group ID	Indicates the group ID for the settings contained in the same row. Group ID "Normal" indicates there is no aggregation. Only one group ID is valid per port.
Port Members	Each switch port is listed for each group ID. Select a radio button to include a port in an aggregation, or clear the radio button to remove the port from the aggregation. By default, no ports belong to any aggregation group.

Console: Aggregation Lookup	
Description	Lookup link aggregation.
Syntax	`aggr lookup [<aggr_id>]`
Parameters	***<aggr_id>***: Aggregation ID , global: 1-2, local: 3-14

Example:

Show aggregation status

```
SWITCH/>aggr lookup 1

Aggr ID  Name    Type    Ports
-------  -----   -----   ------
1        GLAG1   Static    1-4
```

Console: Aggregation Add	
Description	Add or modify link aggregation.
Syntax	`aggr add <port_list> [<aggr_id>]`
Parameters	***<port_list>***: Port list ***<aggr_id>***: Aggregation ID, global: 1-2, local: 3-14
Default Setting	disable

Example:

Add port 1~4 in Group1

```
SWITCH/>aggr add 1-4 1
```

Console: Aggregation Delete	
Description	Delete link aggregation.
Syntax	`aggr delete <aggr_id>`
Parameters	***<aggr_id>***: Aggregation ID, global: 1-2, local: 3-14

Example:

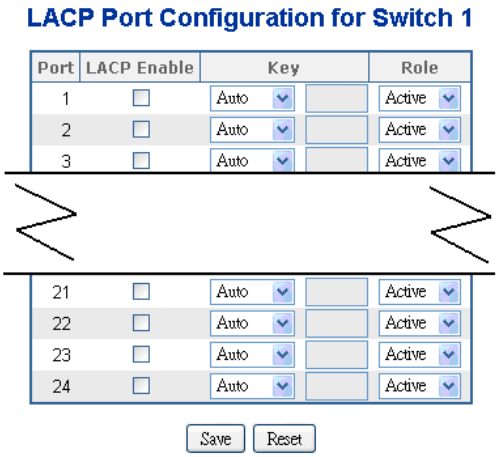
Delete Group2

```
SWITCH/>aggr delete 2
```

4.4.2 LACP Configuration

Link Aggregation Control Protocol (LACP) - LACP LAG negotiate Aggregated Port links with other LACP ports located on a different device. LACP allows switches connected to each other to discover automatically whether any ports are member of the same LAG.

The commands and webpage allows the user to inspect and change the current LACP port configurations. The LACP port settings relate to the currently selected stack unit.



The page includes the following fields:

Object	Description
Port	The switch port number.
LACP Enabled	Enable or disable LACP on this switch port.
Key	The Key value incurred by the port ranging between ***1-65535***. • **Auto**: The default setting. Sets the key as appropriate to the physical link speed, 10Mb = 1, 100Mb = 2, 1Gb = 3 • **Specific**: a user-defined value can be entered. Ports with the same Key value can participate in the same aggregation group, while ports with different keys cannot.
Role	The Role shows the LACP activity status. Active will transmit LACP packets each second while Passive will wait for a LACP packet from a partner.

Console: LACP Configuration	
Description	Show LACP configuration.
Syntax	`lacp configuration [<port_list>]`
Parameters	***<port_list>***: Port list or 'all', default: All ports

Example:

Show LACP configuration

```
SWITCH/>lacp configuration

Port  Mode     Key   Role
----  ----     ---   ----
1     Disabled  Auto  Active
2     Disabled  Auto  Active
3     Disabled  Auto  Active
4     Disabled  Auto  Active
5     Disabled  Auto  Active
6     Disabled  Auto  Active
7     Disabled  Auto  Active
8     Disabled  Auto  Active
9     Disabled  Auto  Active
10    Disabled  Auto  Active
11    Disabled  Auto  Active
12    Disabled  Auto  Active
13    Disabled  Auto  Active
14    Disabled  Auto  Active
15    Disabled  Auto  Active
16    Disabled  Auto  Active
17    Disabled  Auto  Active
18    Disabled  Auto  Active
19    Disabled  Auto  Active
20    Disabled  Auto  Active
21    Disabled  Auto  Active
22    Disabled  Auto  Active
23    Disabled  Auto  Active
24    Disabled  Auto  Active
```

Console: LACP Mode	
Description	Set or show LACP mode.
Syntax	`lacp mode` **[*<port_list>*] [enable|disable]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable** : Enable LACP protocol **disable**: Disable LACP protocol (default: Show LACP mode)
Default Setting	disable

Example:

Enable LACP for port1~4

```
SWITCH/>lacp mode 1-4 enable
```

Console: LACP Key	
Description	Set or show the LACP key.
Syntax	`lacp key` **[*<port_list>*] [*<key>*]**
Parameters	***<port_list>***: Port list or 'all', default: All ports ***<key>***: LACP key (1-65535) or 'auto'
Default Setting	auto

Example:

Set key1 for port1~4

```
SWITCH/>lacp key 1-4 1
```

Console: LACP Role	
Description	Set or show the LACP role.
Syntax	`Lacp role` **[*<port_list>*] [active|passive]**
Parameters	***<port_list>*:** Port list or 'all', default: All ports **active :** Initiate LACP negotiation **passive:** Listen for LACP packets (default: Show LACP role)

Default Setting	active

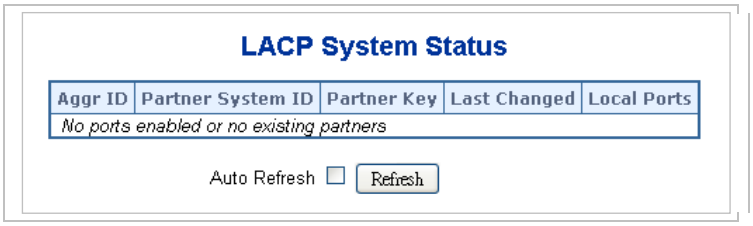
Example:

Set passive for port1~4

```
SWITCH/>lacp role 1-4 passive
```

4.4.3 LACP System/Port Status

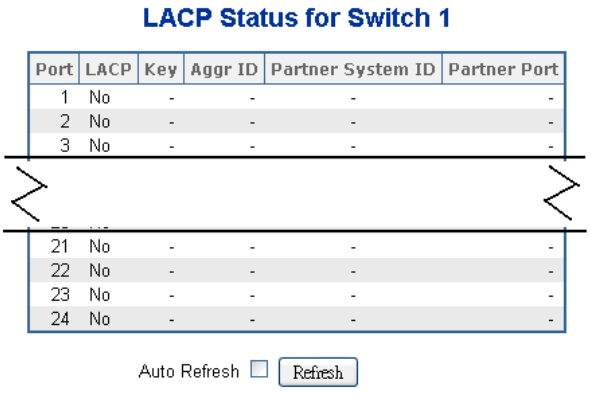
These pages provide status overviews for all and individual LACP instances. The LACP System Status page displays the current LACP aggregation Groups.



The page includes the following fields:

Object	Description
Aggr ID	The Aggregation ID associated with this aggregation instance. For LLAG the id is shown as 'isid:aggr-id' and for GLAGs as 'aggr-id'
Partner System ID	The system ID (MAC address) of the aggregation partner.
Partner Key	The Key that the partner has assigned to this aggregation ID.
Last changed	The time since this aggregation changed.
Local Ports	Shows which ports are a part of this aggregation for this switch/stack. The format is: "Switch ID:Port".

The LACP Status page provides a status overview for LACP status for all ports on a switch.



The page includes the following fields:

Object	Description
Port	The switch port number.
LACP	• 'Yes' means that LACP is enabled and the port link is up. • 'No' means that LACP is not enabled or that the port link is down. • 'Backup' LACP status is disabled and the port could not join the aggregation group but

	will join if another port leaves.
Key	The key assigned to this port. Only ports with the same key can aggregate together.
Aggr ID	The Aggregation ID assigned to this aggregation group. IDs 1 and 2 are GLAGs while IDs 3-14 are LLAGs.
Partner System ID	The partners System ID (MAC address).
Partner Port	The partners port number connected to this port.

Console: LACP Status	
Description	Show LACP Status.
Syntax	`lacp status` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports
Default Setting	active

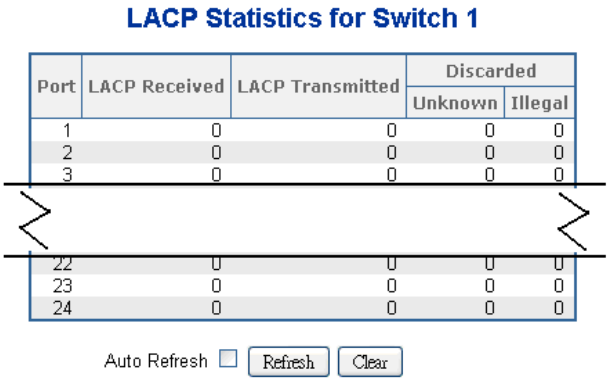
Example:

Show LACP status of port1~4

```
SWITCH/>lacp status 1-4

Port  Mode      Key    Aggr ID  Partner System ID  Partner Port
----  ----      ---    -------  -----------------  ------------
1     Disabled   1       -        -                  -
2     Disabled   1       -        -                  -
3     Disabled   1       -        -                  -
4     Disabled   1       -        -                  -
```

4.4.4 LACP Port Statistics

Display LACP statistics overview for all ports on a switch.



The page includes the following fields:

Object	Description
Port	The switch port number.
LACP Transmitted	Shows how many LACP frames have been sent from each port.
LACP Received	Shows how many LACP frames have been received at each port.
Discarded	Shows how many unknown or illegal LACP frames have been discarded at each port.

Console: LACP Statistics	
Description	Show LACP Statistics.
Syntax	`lacp statistics [<port_list>] [clear]`
Parameters	***<port_list>*:** Port list or 'all', default: All ports **clear:** Clear LACP statistics

Example:

Show LACP statistics of port1~4

```
SWITCH/>lacp statistics 1-4

Port  Rx Frames     Tx Frames   Rx Unknown   Rx Illegal
----  -----------  ----------  -----------  ----------
1      0            0           0            0
2      0            0           0            0
3      0            0           0            0
4      0            0           0            0
```

4.5 VLAN

4.5.1 VLAN Overview

A Virtual Local Area Network (VLAN) is a network topology configured according to a logical scheme rather than the physical location. VLAN can be used to combine any collection of LAN segments into an autonomous user group that appears as a single LAN. VLAN also logically segment the network into different broadcast domains so that packets are forwarded only between ports within the VLAN. Typically, a VLAN corresponds to a particular subnet, although not necessarily.

End nodes that frequently communicate with each other are assigned to the same VLAN, regardless of where they are physically on the network. Logically, a VLAN can be equated to a broadcast domain, because broadcast packets are forwarded to only members of the VLAN on which the broadcast was initiated.

Currently we support following VLAN types:

- **CLI/Web/SNMP**: These are referred to as static.
- **NAS**: NAS provides port-based authentication, which involves communications between a Supplicant, Authenticator, and an Authentication Server.
- **Voice VLAN**: Voice VLAN is a VLAN configured specifically for voice traffic typically originating from IP phones.
- **MVR**: MVR is used to eliminate the need to duplicate multicast traffic for subscribers in each VLAN. Multicast traffic for all channels is sent only on a single (multicast) VLAN.
- **MSTP**: The 802.1s Multiple Spanning Tree protocol (MSTP) uses VLANs to create multiple spanning trees in a network, which significantly improves network resource utilization while maintaining a loop-free environment.

No matter what basis is used to uniquely identify end nodes and assign these nodes VLAN membership, packets cannot cross VLAN without a network device performing a routing function between the VLAN.
The Managed Switch supports IEEE 802.1Q VLAN. The port untagging function can be used to remove the 802.1 tag from packet headers to maintain compatibility with devices that are tag-unaware.
The Switch's default is to assign all ports to a single 802.1Q VLAN named DEFAULT_VLAN. As new VLANs are created, the member ports assigned to a new VLAN will be removed from the DEFAULT_ VLAN port member list. The DEFAULT_VLAN has a VID = 1.

4.5.2 IEEE 802.1Q VLAN

IEEE 802.1Q (tagged) VLAN is implemented on the Switch. 802.1Q VLAN require tagging, which enables them to span the entire network (assuming all switches on the network are IEEE 802.1Q-compliant). VLANs allow a network to be segmented in order to reduce the size of broadcast domains. All packets entering a VLAN will only be forwarded to IEEE 802.1Q enabled switches that are members of that VLAN, including broadcast, multicast and unicast packets from unknown sources.
VLAN can also provide a level of security to your network. IEEE 802.1Q VLAN will only deliver packets between stations that are members of the VLAN. Any port can be configured as either tagging or untagging.

- **Tagged:** Ports with tagging enabled will put the VID number, priority and other VLAN information into the header of all packets that flow into those ports. If a packet has previously been tagged, the port will not alter the packet, thus keeping the VLAN information intact. The VLAN information in the tag can then be used by other 802.1Q compliant devices on the network to make packet-forwarding decisions.
- **Untagged:** Ports with untagging enabled will strip the 802.1Q tag from all packets that flow into those ports. If the packet does not have an 802.1Q VLAN tag, the port will not alter the packet. Thus, all packets received by and forwarded by an untagging port will have no 802.1Q VLAN information. (Remember that the PVID is only used internally within the Switch). Untagging is used to send packets from an 802.1Q-compliant network device to a non-compliant network device.

➢ **802.1Q VLAN Tags**

There are four additional octets inserted after the source MAC address. Their presence is indicated by a value of 0x8100 in the Ether Type field. When a packet's Ether Type field is equal to 0x8100, the packet carries the IEEE 802.1Q/802.1p tag. The tag is contained in the following two octets and consists of 3 bits of user priority, 1 bit of Canonical Format Identifier (CFI - used for encapsulating Token Ring packets so they can be carried across Ethernet backbones), and 12 bits of VLAN ID (VID). The 3 bits of user priority are used by 802.1p. The VID is the VLAN identifier and is used by the 802.1Q standard. Because the VID is 12 bits long, 4094 unique VLAN can be identified. The tag is inserted into the packet header making the entire packet longer by 4 octets. All of the information originally contained in the packet is retained.

The Ether Type and VLAN ID are inserted after the MAC source address, but before the original Ether Type/Length or Logical Link Control. Because the packet is now a bit longer than it was originally, the Cyclic Redundancy Check (CRC) must be recalculated.

➢ **Port VLAN ID**

Tagged packets (carrying the 802.1Q VID information) can be transmitted from one 802.1Q compliant network device to another with VLAN information intact. This allows 802.1Q VLANs to span network devices or even the entire network provided that all network devices are 802.1Q compliant.
All physical ports on a switch have a PVID. 802.1Q ports are also assigned a PVID for use within the switch. If no VLANs are defined on the switch, all ports are then assigned to a default VLAN with a PVID equal to 1. Any untagged packet is assigned the PVID of the port on which they were received. Forwarding decisions are based upon this PVID in so far as VLAN are concerned. Tagged packets are forwarded according to the VID contained within the tag. Tagged packets are also assigned a PVID, but the VID is used to make packet forwarding decisions, rather than the PVID.
Tag-aware switches must keep a table to relate PVID within the switch to a network VID. The switch will compare the VID of a

packet to be transmitted to the VID of the port that is to transmit the packet. If the two VIDs are different the switch, the packet is dropped. Because of the existence of the PVID for untagged packets and the VID for tagged packets, tag-aware and tag-unaware network devices are allowed to coexist on the same network.

A switch port can have only one PVID, but can have as many VIDs as the switch has memory in its VLAN table to store them. Because some devices on a network may be tag-unaware, a decision must be made at each port on a tag-aware device before packets are transmitted. If the transmitting port is connected to a tag-unaware device, the packet should be untagged. If the transmitting port is connected to a tag-aware device, the packet should be tagged.

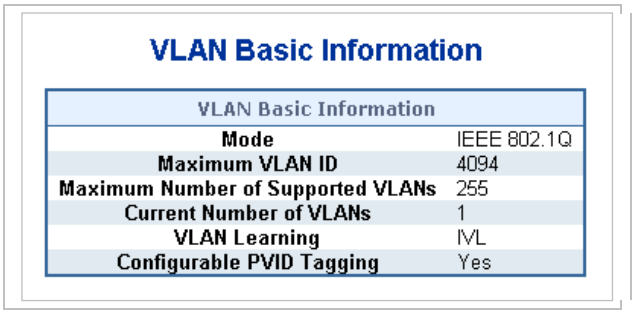
VLAN-tagged frames can pass through VLAN-aware or VLAN-unaware network interconnection devices, but the VLAN tags should be stripped off before passing it on to any end-node host that does not support VLAN tagging.

- **Untagged VLANs**

Untagged (or static) VLANs are typically used to reduce broadcast traffic and to increase security. A group of network users assigned to a VLAN form a broadcast domain that is separate from other VLANs configured on the switch. Packets are forwarded only between ports that are designated for the same VLAN. Untagged VLANs can be used to manually isolate user groups or subnets.

4.5.3 VLAN Basic Information

Display basic information on the VLAN type supported by the Managed Switch.



The page includes the following fields:

Object	Description
Mode	Display the current VLAN mode used by this Managed Switch
Maximum VLAN ID	Maximum VLAN ID recognized by this Managed Switch.
Maximum Number of Supported VLANs	Maximum number of VLANs that can be configured on this Managed Switch.
Current number of VLANs	Display the current number of VLANs
VLAN Learning	Display the VLAN learning mode. The Managed Switch supports IVL (IVL Independent VLAN learning).
Configurable PVID Tagging	Indicates whether or not configurable PVID tagging is implemented.

Console: VLAN Lookup	
Description	Lookup VLAN entry.
Syntax	`vlan lookup` ***[<vid>]*** **`[combined|static|nas|mvr|voice_vlan|all]`**
Parameters	***<vid>***: VLAN ID (1-4095), default: Show all VLANs **combined**: Shows All the Combined VLAN database **static**: Shows the VLAN entries configured by the administrator **nas**: Shows the VLANs configured by NAS **mvr**: Shows the VLANs configured by MVR **voice_vlan**: Shows the VLANs configured by Voice VLAN **all**: Shows all VLANs' configuration

Example:

Show VLAN status

```
SWITCH/>vlan lookup

VID   Ports
----  -----
1     1-24
200   None
```

Console: VLAN Mode	
Description	Set or show the VLAN Mode.
Syntax	`vlan mode` **`[portbased|dot1q]`**
Parameters	**portbased**: Port-Based VLAN Mode **dot1q**: 802.1Q VLAN Mode (default: Show VLAN Mode)
Default Setting	IEEE 802.1Q

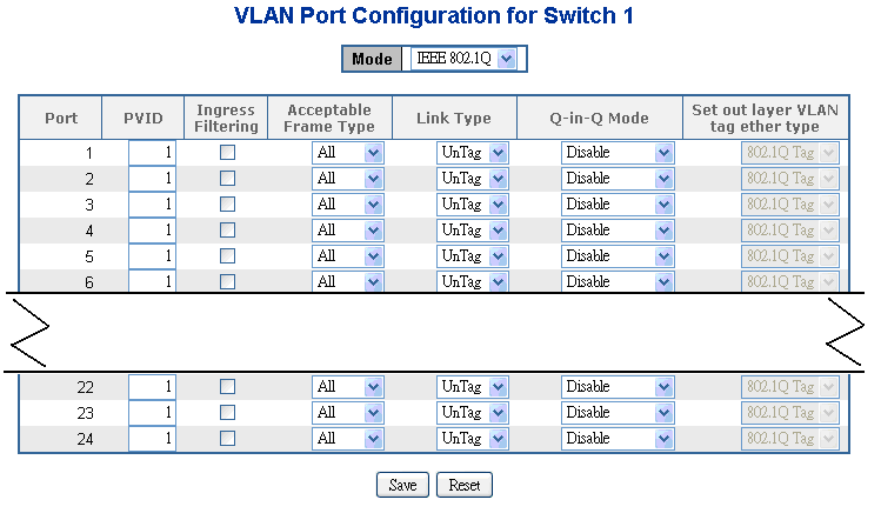
Example:

Set VLAN mode in port base

```
SWITCH/>vlan mode portbased
```

4.5.4 VLAN Port Configuration

VLAN Port Configuration manages ports on a switch that are part of a VLAN. The port default VLAN ID (PVID) is configured on the VLAN Port Configuration page. All untagged packets arriving to the device are tagged by the ports PVID.



The page includes the following fields:

Object	Description
Port	This is the logical port number for this row.
PVID	Assign PVID for selected port. The range for the PVID is ***1-4094***. The PVID will be inserted into all untagged frames entering the ingress port. The PVID must as same as the VLAN ID that the port belong to VLAN group, or the untagged traffic will be dropped.
Ingress Filtering	Enable ingress filtering for a port by checking the box. By default, ingress filtering is disabled (no checkmark).
Accept Frame Type	Determines whether the port accepts all frames or only tagged frames. If the port only accepts tagged frames, untagged frames received on the port are discarded. By default, the field is set to All.
Link Type	Allow 802.1Q Untagged or Tagged VLAN for selected port. When adding a VLAN to selected port, it tells the switch whether to keep or remove the tag from a frame on egress. • **Untag**: outgoing frames without VLAN-Tagged. • **Tagged**: outgoing frames with VLAN-Tagged.
Q-in-Q Mode	Sets the Managed Switch to QinQ mode, and allows the QinQ tunnel port to be configured. The default is for the Managed Switch to function in Disabled mode. • **Disable**: The port operates in its normal VLAN mode. (This is the default.) • **MAN Port**: Configures IEEE 802.1Q tunneling (QinQ) for an uplink port to another device within the service provider network. • **Customer Port**: Configures IEEE 802.1Q tunneling (QinQ) for a client access port to segregate and preserve customer VLAN IDs for traffic crossing the service provider network.
Set Out layer VLAN tag ether type	The Tag Protocol Identifier (TPID) specifies the ethertype of incoming packets on a tunnel access port. • **802.1Q Tag**: 8100 • **vMAN Tag**: 88A8 • **Default** : 802.1Q Tag

The port must be a member of the same VLAN as the Port VLAN ID.

Console: VLAN Configuration	
Description	Show VLAN configuration.
Syntax	`vlan configuration` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', (default: All ports)

Example:

Show VLAN status of port1

```
SWITCH/>vlan configuration 1

VLAN Configuration:
===================


Mode : IEEE 802.1Q
Port  PVID  IngrFilter  FrameType   LinkType  Q-in-Q Mode  Eth type
----  ----  ----------  ----------  --------  -----------  --------
1     1     Disabled    All         UnTag     Disable      N/A

VID   Ports
---   -----
1     1-24
```

Console: VLAN PVID	
Description	Set or show the port VLAN ID.
Syntax	`vlan pvid` ***[<port_list>]*** **[<*vid*>|none]**
Parameters	***<port_list>***: Port list or 'all', default: All ports ***<vid>*****|none** : Port VLAN ID (1-4095) or 'none', (default: Show port VLAN ID)
Default Setting	1

Example:

Set PVID2 for port20

```
SWITCH/>vlan pvid 20 2
```

Console: VLAN Frame Type	
Description	Set or show the port VLAN frame type.
Syntax	`vlan frametype` ***[<port_list>]*** **[all|tagged]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **all**: Allow tagged and untagged frames **tagged**: Allow tagged frames only (default: Show accepted frame types)
Default Setting	All

Example:

Set port20 that allow tagged frames only

```
SWITCH/>vlan frametype 20 tagged
```

Console: VLAN Ingress Filter	
Description	Set or show the port VLAN ingress filter.
Syntax	`vlan ingressfilter` ***[<port_list>]*** **[enable|disable]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable VLAN ingress filtering **disable**: Disable VLAN ingress filtering (default: Show VLAN ingress filtering)
Default Setting	Disable

Example:

Enable VLAN ingress filtering for port20

```
SWITCH/>vlan ingressfilter 20 enable
```

Console: VLAN Link Type	
Description	Set or show the port VLAN link type.
Syntax	`vlan linktype` ***[<port_list>]*** **[untagged|tagged]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **untagged**: VLAN Link Type Tagged **tagged**: VLAN Link Type Untagged (default: Show VLAN link type)
Default Setting	Untagged

Example:

Enable tagged frame for port2

```
SWITCH/>vlan linktype 2 tagged
```

Console: VLAN Q-in-Q Mode	
Description	Set or show the port Q-in-Q mode.
Syntax	`vlan qinqmode` ***[<port_list>]*** **[disable|man|customer]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **disable**: Disable Q-in-Q VLAN Mode **man**: Q-in-Q MAN Port Mode **customer**: Q-in-Q Customer Port Mode (default: Show VLAN QinQ Mode)

Example:

Set port2 in man port

```
SWITCH/>vlan qinq 2 man
```

Console: VLAN Ethernet Type	
Description	Set or show out layer VLAN tag ether type in Q-in-Q VLAN mode.
Syntax	`vlan ethtype` ***[<port_list>]*** **[man|dot1q]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **man**: Set out layer VLAN tag ether type : MAN **dot1q**: Set out layer VLAN tag ether type : 802.1Q (default: Show VLAN out layer VLAN tag ether type)

Example:

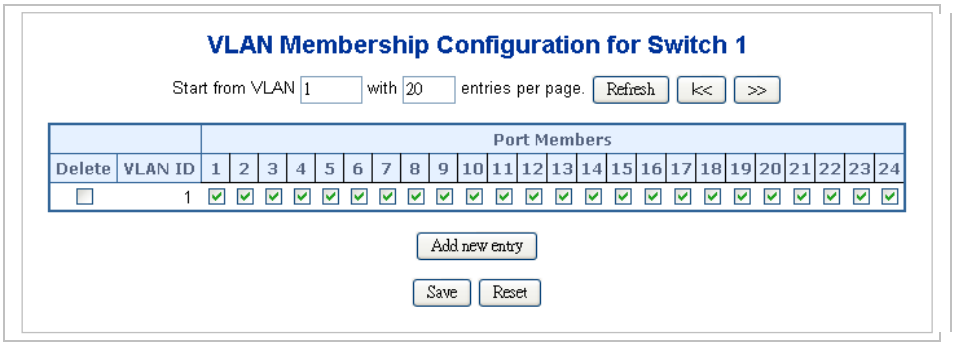
Set out layer VLAN tag Ethernet type for port 10 in man Ethernet type

```
SWITCH/>vlan ethtype 10 man
```

4.5.5 VLAN Membership Configuration

- **Adding Static Members to VLANs (VLAN Index)**

Use the VLAN Static Table to configure port members for the selected VLAN index. The VLAN membership configuration for the selected stack switch / unit switch can be monitored and modified here. Up to 255 VLANs are supported. This page allows for adding and deleting VLANs as well as adding and deleting port members of each VLAN. The VLAN Membership


VLAN Membership Configuration for Switch 1
Start from VLAN 1 with 20 entries per page.
Refresh
<<
>>
Port Members
Delete
VLAN ID
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
1
Add new entry
Save
Reset

The page includes the following fields:

Object	Description
Delete	To delete a VLAN entry, check this box. The entry will be deleted on all stack switch units during the next Save.
VLAN ID	Indicates the ID of this particular VLAN.
Port Members	A row of check boxes for each port is displayed for each VLAN ID. To include a port in a VLAN, check the box. By default, no ports are members, and all boxes are unchecked.
Adding a New VLAN	1. Click to add a new VLAN ID. An empty row is added to the table, and the VLAN can be configured as needed. Legal values for a VLAN ID are ***1*** through ***4095***. 2. The VLAN is enabled on the selected stack switch unit when you click on **Save**. The VLAN is then present on other stack switch units, but with no port members. A VLAN without any port members on any stack unit will be deleted when you click **Save**. The button can be used to undo the addition of new VLANs.

Buttons

Add new entry: Click to add new VLAN.

Refresh: Refreshes the displayed table starting from the "VLAN ID" input fields.

<<: Updates the table starting from the first entry in the VLAN Table, i.e. the entry with the lowest VLAN ID.

>>: Updates the table, starting with the entry after the last entry currently displayed.

Console: VLAN Add	
Description	Add or modify VLAN entry.
Syntax	`vlan add` ***<vid> [<port_list>]***
Parameters	***<vid>***: VLAN ID (1-4095) ***<port_list>***: Port list or 'all', default: All ports
Default Setting	1

Example:

Add port17 to port24 in VLAN10

```
SWITCH/>vlan add 10 17-24
```

Console: VLAN Delete	
Description	Delete VLAN entry.
Syntax	`vlan delete` ***<vid>***
Parameters	***<vid>***: VLAN ID (1-4095)

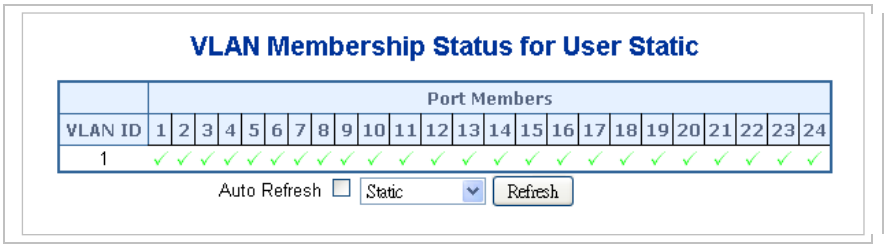
Example:

Delete port17 to port24 in VLAN10

```
SWITCH/>vlan delete 10
```

4.5.6 VLAN Membership Status for User Static

This page provides an overview of membership status for VLAN users.


VLAN Membership Status for User Static
Port Members
VLAN ID 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
1
Auto Refresh
Static
Refresh

The page includes the following fields:

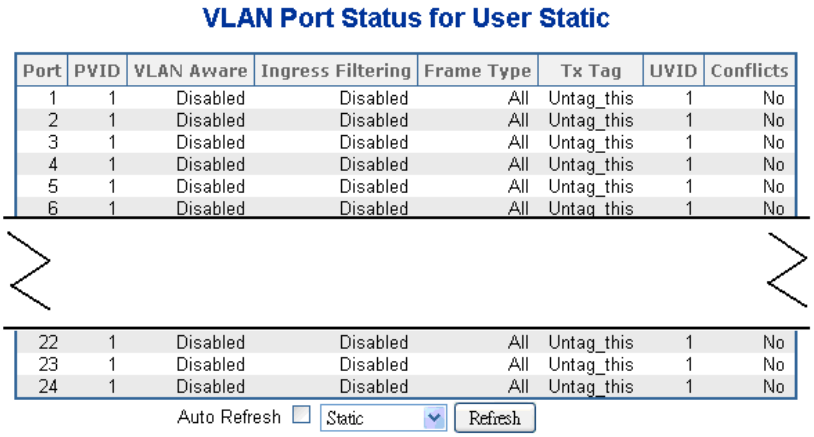
Object	Description
VLAN ID	Indicates the ID of this particular VLAN.
Port Members	The VLAN Membership Status Page displays the current VLAN port members for all VLANs configured by a selected VLAN User (selection shall be allowed by a Combo Box). By default, all VLAN Users are selected and information is shown for all the VLAN Users.
VLAN User	A VLAN User is a module that uses services such as PVID and UVID. See the VLAN Overview section for more details on the options.

Buttons

: Select VLAN Users from this drop down list.

4.5.7 VLAN Port Status

This page provides VLAN Port Status.


VLAN Port Status for User Static
Port PVID VLAN Aware Ingress Filtering Frame Type Tx Tag UVID Conflicts
1 1 Disabled Disabled All Untag_this 1 No
2 1 Disabled Disabled All Untag_this 1 No
3 1 Disabled Disabled All Untag_this 1 No
4 1 Disabled Disabled All Untag_this 1 No
5 1 Disabled Disabled All Untag_this 1 No
6 1 Disabled Disabled All Untag_this 1 No
22 1 Disabled Disabled All Untag_this 1 No
23 1 Disabled Disabled All Untag_this 1 No
24 1 Disabled Disabled All Untag_this 1 No
Auto Refresh
Static
Refresh

The page includes the following fields:

Object	Description
Port	The logical port for the settings contained in the same row.
PVID	Shows the VLAN identifier for that port. The allowed values are ***1*** through ***4095***. The default value is 1.
VLAN Aware	Show the VLAN Awareness for the port. • If VLAN awareness is enabled, the tag is removed from tagged frames received on the port. VLAN tagged frames are classified to the VLAN ID in the tag. • If VLAN awareness is disabled, all frames are classified to the Port VLAN ID and tags are not removed.
Ingress Filtering	Show the ingress filtering for a port. This parameter affects VLAN ingress processing. If ingress filtering is enabled and the ingress port is not a member of the classified VLAN of the frame, the frame is discarded.
Frame Type	Shows whether the port accepts all frames or only tagged frames. This parameter affects VLAN ingress processing. If the port only accepts tagged frames, untagged frames received on that port are discarded.
Tx Tag	Shows egress filtering frame status whether tagged or untagged.
UVID	Shows UVID (untagged VLAN ID). A port's UVID determines the packet's behaviour at the egress side.
Conflicts	This field displays whether or not a conflict exists. The following conflicts are possible: • Functional Conflicts between features. • Conflicts due to hardware limitations. • Direct conflicts between user modules.
VLAN User	A VLAN User is a module that uses services of the VLAN management functions to configure VLAN memberships and VLAN port configuration such as PVID, UVID. See the VLAN Overview section for more details on the options.

Buttons

: Select VLAN Users from this drop down list.

Console: VLAN Status	
Description	VLAN Port Configuration Status.
Syntax	`vlan status` ***`[<port_list>]`*** **`[combined|static|nas|mvr|voice_vlan|mstp|all|conflicts]`**
Parameters	***<port_list>***: Port list or 'all', default: All ports **combined**: combined VLAN Users configuration **static**: static port configuration **nas**: NAS port configuration **mvr**: MVR port configuration **voice_vlan**: Voice VLAN port configuration **mstp**: MSTP port configuration

	all: All VLAN Users configuration (default: combined VLAN Users configuration)

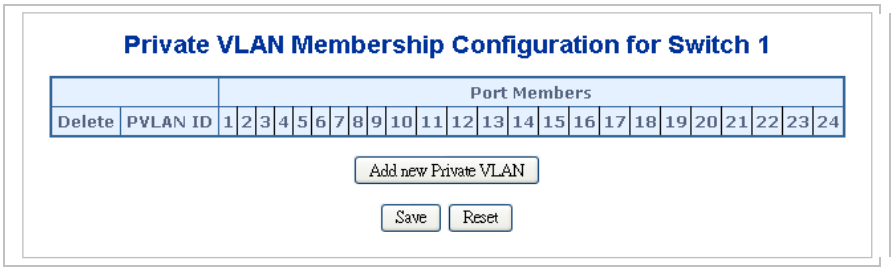
Example:

Show VLAN configuration of port10

```
SWITCH/>status 1

Port VLAN User  Aware   PVID FrameType Ing Filter Tx Tag     UVID Conflicts
---- ---------  ------- ---- --------- ---------- ---------- ---- ---------
1    Static     Enabled   1       All  Disabled   Untag This 1
     NAS                                                          No
     MVR                                                          No
     Voice VLAN                                                   No
     MSTP                                                         No
     Combined   Enabled   1        All  Disabled   Untag This 1       No
```

4.5.8 Private VLAN Membership Configuration

Private VLANs are based on the source port mask, and there are no connections to VLANs. This means that VLAN IDs and Private VLAN IDs can be identical. A port must be a member of both a VLAN and a Private VLAN to be able to forward packets. By default, all ports are VLAN unaware and members of VLAN 1 and Private VLAN 1. A VLAN unaware port can only be a member of one VLAN, but it can be a member of multiple Private VLANs.


Private VLAN Membership Configuration for Switch 1
Port Members
Delete
PVLAN ID
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Add new Private VLAN
Save
Reset

The page includes the following fields:

Object	Description
Delete	To delete a VLAN entry, check this box. The entry will be deleted on all stack switch units during the next Save.
VLAN ID	Indicates the ID of this particular VLAN.
Port Members	A row of check boxes for each port is displayed for each VLAN ID. Check this box to include a port in a VLAN. By default, no ports are members, and all boxes are unchecked.
Adding a New VLAN	1. Click to add a new VLAN ID. An empty row is added to the table, and the VLAN can be configured as needed. Legal values for a VLAN ID are ***1*** through ***4095***. 2. The VLAN is enabled on the selected stack switch unit when you click on **Save**. The VLAN is then present on other stack switch units, but with no port members. A VLAN without any port members on any stack unit will be deleted when you click **Save**. The button can be used to undo the addition of new VLANs.

Buttons

Add new Private VLAN: Click to add new VLAN.

Console: PVLAN Status	
Description	Show Private VLAN configuration.
Syntax	`pvlan configuration` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports

Example:

Show private VLAN configuration

```
SWITCH/> pvlan configuration

Private VLAN Configuration:
===========================


Port  Isolation
----  ---------
1     Disabled
2     Disabled
3     Disabled
4     Disabled
5     Disabled
6     Disabled
7     Disabled
8     Disabled
9     Disabled
10    Disabled
11    Disabled
12    Disabled
13    Disabled
14    Disabled
15    Disabled
16    Disabled
17    Disabled
18    Disabled
19    Disabled
20    Disabled
21    Disabled
22    Disabled
23    Disabled
24    Disabled

PVLAN ID  Ports
--------  -----
1         1-24
```

Console: PVLAN Add	
Description	Add or modify Private VLAN entry.
Syntax	`pvlan add` ***<pvlan_id> [<port_list>]***
Parameters	***<pvlan_id>***: Private VLAN ID ***<port_list>***: Port list or 'all', default: All ports

Example:

Add port17 to port24 in PVLAN10

```
SWITCH/>pvlan add 10 17-24
```

Console: PVLAN Delete	
Description	Delete Private VLAN entry.
Syntax	`pvlan delete` ***<pvlan_id>***
Parameters	***<pvlan_id>***: Private VLAN ID

Example:

Delete PVLAN10

```
SWITCH/>pvlan delete 10
```

Console: PVLAN Lookup	
Description	Lookup Private VLAN entry.
Syntax	`pvlan lookup` ***[<pvlan_id>]***
Parameters	***<pvlan_id>***: Private VLAN ID

Example:

Lookup PVLAN

```
SWITCH/> lookup

PVLAN ID  Ports
--------  -----
1         1-24
```

4.5.9 Port Isolation Configuration

➢ **Overview**

When a VLAN is configured to be a private VLAN, communication between ports within that VLAN can be prevented. For private VLANs to be applied, the switch must first be configured for standard VLAN operation. Ports in a private VLAN fall into one of these two groups:

➢ **Promiscuous ports**

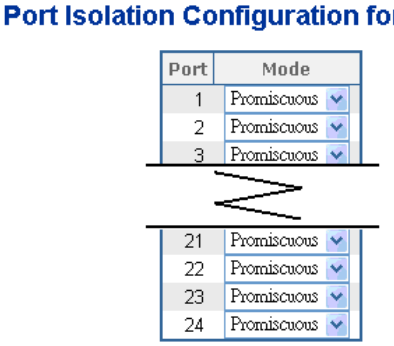
- Ports from which traffic can be forwarded to all ports in the private VLAN
- Ports which can receive traffic from all ports in the private VLAN

➢ **Isolated ports**

- Ports from which traffic can only be forwarded to promiscuous ports in the private VLAN
- Ports which can receive traffic from only promiscuous ports in the private VLAN

The configuration of promiscuous and isolated ports applies to all private VLANs. When traffic comes in on a promiscuous port in a private VLAN, the VLAN mask from the VLAN table is applied. When traffic comes in on an isolated port, the private VLAN mask is applied in addition to the VLAN mask from the VLAN table. This reduces the ports to which forwarding can be done to just the promiscuous ports within the private VLAN.

The port settings relate to the currently selected stack unit, as reflected by the page header.



The page includes the following fields:

Object	Description
Port	The switch interface.
PVLAN Port Type	Displays private VLAN port types. • Isolated: A single stand-alone VLAN that contains one promiscuous port and one or more isolated (or host) ports. This VLAN conveys traffic between the isolated ports and a lone promiscuous port. • Promiscuous: A promiscuous port can communicate with all the interfaces within a private VLAN. This is the default setting.

Console: PVLAN Isolate	
Description	Set or show the port isolation mode.
Syntax	`pvlan isolate` **`[<port_list>] [enable|disable]`**
Parameters	**<port_list>**: Port list or 'all', default: All ports **enable** : Enable port isolation **disable** : Disable port isolation (default: Show port isolation port list)
Default Setting	Promiscuous

Example:

Enable isolate for port10

```
SWITCH/>pvlan isolate 10 enable
```

4.6 Spanning Tree Protocol

4.6.1 Theory

The Spanning Tree protocol can be used to detect and disable network loops, and to provide backup links between switches, bridges or routers. This allows the switch to interact with other bridging devices in your network to ensure that only one route exists between any two stations on the network, and provide backup links which automatically take over when a primary link goes down. The spanning tree algorithms supported by this switch include these versions:

- **STP – Spanning Tree Protocol (IEEE 802.1D)**

  Provides a single path between end stations, avoiding and eliminating loops.

- **RSTP – Rapid Spanning Tree Protocol (IEEE 802.1w)**

  Detects and uses of network topologies that provide faster spanning tree convergence, without creating forwarding loops.

- **MSTP – Multiple Spanning Tree Protocol (IEEE 802.1s)**

  Defines an extension to RSTP to further develop the usefulness of virtual LANs (VLANs). This "Per-VLAN" Multiple Spanning Tree Protocol configures a separate Spanning Tree for each VLAN group and blocks all but one of the possible alternate paths within each Spanning Tree.

2. STP Parameters

STP Operation Levels

It is advisable to keep the default settings unless changes are absolutely necessary. The user changeable parameters in the Switch are as follows: The Switch allows for two levels of operation: the switch level and the port level. The switch level forms a spanning tree consisting of links between one or more switches. The port level constructs a spanning tree consisting of groups of one or more ports. The STP operates in much the same way for both levels.

On the switch level, STP calculates the Bridge Identifier for each switch and then sets the Root Bridge and the Designated Bridges.
On the port level, STP sets the Root Port and the Designated Ports.

The following are the user-configurable STP parameters for the switch level:

Parameter	Description	Default Value
Bridge Identifier(Not user configurable except by setting priority below)	A combination of the User-set priority and the switch's MAC address. The Bridge Identifier consists of two parts: a 16-bit priority and a 48-bit Ethernet MAC address 32768 + MAC	32768 + MAC
Priority	A relative priority for each switch – lower numbers give a higher priority and a greater chance of a given switch being elected as the root bridge. A Priority for the switch can be set from 0 to 65535. 0 is equal to the highest Priority.	32768
Hello Time	The length of time between broadcasts of the "hello" message by the switch. The Hello Time can be from 1 to 10 seconds. This is the interval between two transmissions of BPDU packets sent by the Root Bridge to tell all other Switches that it is indeed the Root Bridge. If you set a Hello Time for your Switch, and it is not the Root Bridge, the set Hello Time will be used if and when your Switch becomes the Root Bridge.	2 seconds
Maximum Age Timer	The Max Age can be from 6 to 40 seconds. At the end of the Max Age, if a BPDU has still not been received from the Root Bridge, your Switch will start sending its own BPDU to all other Switches for permission to become the Root Bridge. If it turns out that your Switch has the lowest Bridge Identifier, it will become the Root Bridge. Measures the age of a received BPDU for a port and ensures that the BPDU is discarded when its age exceeds the value of the maximum age timer.	20 seconds
Forward Delay Timer	The amount time spent by a port in the learning and listening states waiting for a BPDU that may return the port to the blocking state. The Forward Delay can be from 4 to 30 seconds. This is the time any port on the Switch spends in the listening state while moving from the blocking state to the forwarding state.	15 seconds

The Hello Time cannot be longer than the Max. Age. Otherwise, a configuration error will occur.

The following are the user-configurable STP parameters for the port or port group level:

Variable	Description	Default Value
Port Priority	A relative priority for each port –lower numbers give a higher priority and a greater chance of a given port being elected as the root port. A Port Priority can be from 0 to 240. The lower the number, the greater the probability the port will be chosen as the Root Port.	128

Port Cost	A value used by STP to evaluate paths – STP calculates path costs and selects the path with the minimum cost as the active path. A Port Cost can be set from 0 to 200000000. The lower the number, the greater the probability the port will be chosen to forward packets.	200,000-100Mbps Fast Ethernet ports 20,000-1000Mbps Gigabit Ethernet ports 0 - Auto

➢ **Default Spanning-Tree Configuration**

Feature	Default Value
Enable state	STP disabled for all ports
Port priority	128
Port cost	0
Bridge Priority	32,768

Console: STP Configuration	
Description	Show STP configuration.
Syntax	`stp configuration`

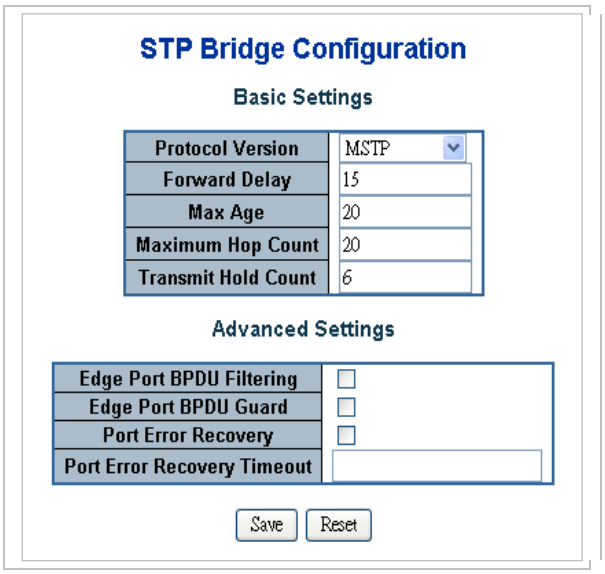
Example:

Show STP configuration.

```
SWITCH/>stp configuration

STP Configuration:
==================

Protocol Version: MSTP
Max Age         : 20
Forward Delay   : 15
Tx Hold Count   : 6
Max Hop Count   : 20
```

4.6.2 STP Bridge Configuration

Configure STP system settings. The settings are used by all STP Bridge instances in the Switch or switch Stack.



The page includes the following fields:

➢ **Basic Settings**

Object	Description
Protocol Version	The STP protocol version setting.Values: **STP**, **RSTP** and **MSTP**.
Forward Delay	The delay used by STP Bridges to transition Root and Designated Ports to Forwarding (used in STP compatible mode). Valid values are in the range ***4*** to ***30*** seconds • Default: 15 • Minimum: The higher of 4 or [(Max. Message Age / 2) + 1] • Maximum: 30
Max Age	The maximum age of the information transmitted by the Bridge when it is the Root Bridge. Valid values are in the range ***6*** to ***200*** seconds. • Default: 20 • Minimum: The higher of 6 or [2 x (Hello Time + 1)]. • Maximum: The lower of 40 or [2 x (Forward Delay -1)]
Maximum Hop Count	This defines the initial value of remaining Hops for MSTI information generated at the boundary of an MSTI region. Valid values are in the range ***6*** to ***40*** hops.
Transmit Hold Count	The number of BPDU's a bridge port can send per second. Valid values are in the range ***1*** to ***10***.

- **Advanced Settings**

Object	Description
Edge Port BPDU Filtering	Control whether a port explicitly configured as Edge will transmit and receive BPDUs.
Edge Port BPDU Guard	Control whether a port explicitly configured as Edge will disable itself upon reception of a BPDU.
Port Error Recovery	Control whether a port in the error-disabled state will automatically be enabled after a certain time. If recovery is not enabled, ports have to be disabled and re-enabled for normal STP operation.
Port Error Recovery Timeout	The time that has to pass before a port in the error-disabled state can be enabled. Valid values are between ***30*** and ***86400*** seconds (24 hours).

The Gigabit Ethernet Switch implements the Rapid Spanning Protocol as the default spanning tree protocol. While **"Compatible"** mode is selected, the system uses RSTP (802.1w) to work with another STP (802.1d)'s BPDU control packets.

Console: STP Version	
Description	Set or show the STP Bridge protocol version.
Syntax	`stp version` ***[<stp_version>]***
Parameters	***<stp_version>***: mstp|rstp|stp
Default Setting	MSTP

Example:

Set the STP Bridge protocol version.

```
SWITCH/> stp version rstp
```

Console: STP Tx Hold	
Description	Set or show the STP Bridge Transmit Hold Count parameter.
Syntax	`stp txhold` ***[<holdcount>]***
Parameters	***<holdcount>***: STP Transmit Hold Count (1-10)
Default Setting	6

Example:

Set STP Tx hold in 10

```
SWITCH/>stp txhold 10
```

Console: STP MaxHops	
Description	Set or show the MSTP Bridge Max Hop Count parameter.
Syntax	`stp maxhops` ***[<maxhops>]***
Parameters	***<maxhops>***: STP BPDU MaxHops (6-40))
Default Setting	20

Example:

Set STP maximum hops in 25

```
SWITCH/>stp maxhops 25
```

Console: STP MaxAge	
Description	Set or show the CIST/MSTI bridge maximum age.
Syntax	`stp maxage` ***[<max_age>]***
Parameters	***<max_age>***: STP maximum age time (6-40, and max_age <= (forward_delay-1)*2)
Default Setting	20

Example:

Set STP maximum age time in 10

```
SWITCH/>stp maxage 10
```

Console: STP FwdDelay	
Description	Set or show the CIST/MSTI bridge forward delay.
Syntax	`stp fwddelay` ***[<delay>]***
Parameters	***<delay>***: MSTP forward delay (4-30, and max_age <= (forward_delay-1)*2))
Default Setting	15

Example:

Set STP forward delay value in 25

```
SWITCH/>stp fwddelay 25
```

Console: STP Recovery	
Description	Set or show edge port error recovery timeout.
Syntax	`stp recovery` ***[<timeout>]***
Parameters	***<timeout>***: Time before error-disabled ports are reenabled (30-86400 seconds, 0 disables) (default: Show recovery timeout)
Default Setting	Disable

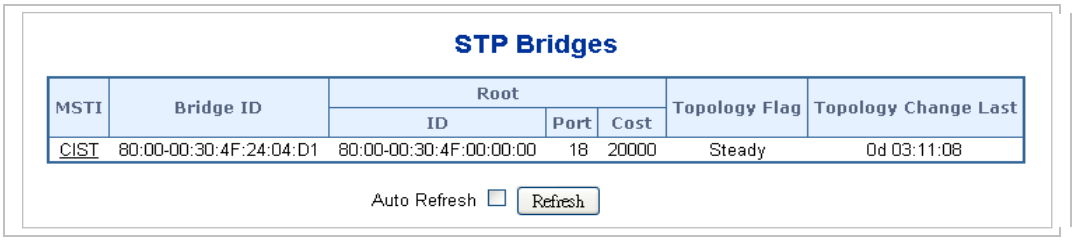
Example:

Set STP recovery value in 30 sec.

```
SWITCH/>stp recovery 30
```

4.6.3 Bridge Status

This page provides a status overview for all STP bridge instances. The displayed table contains a row for each STP bridge instance.

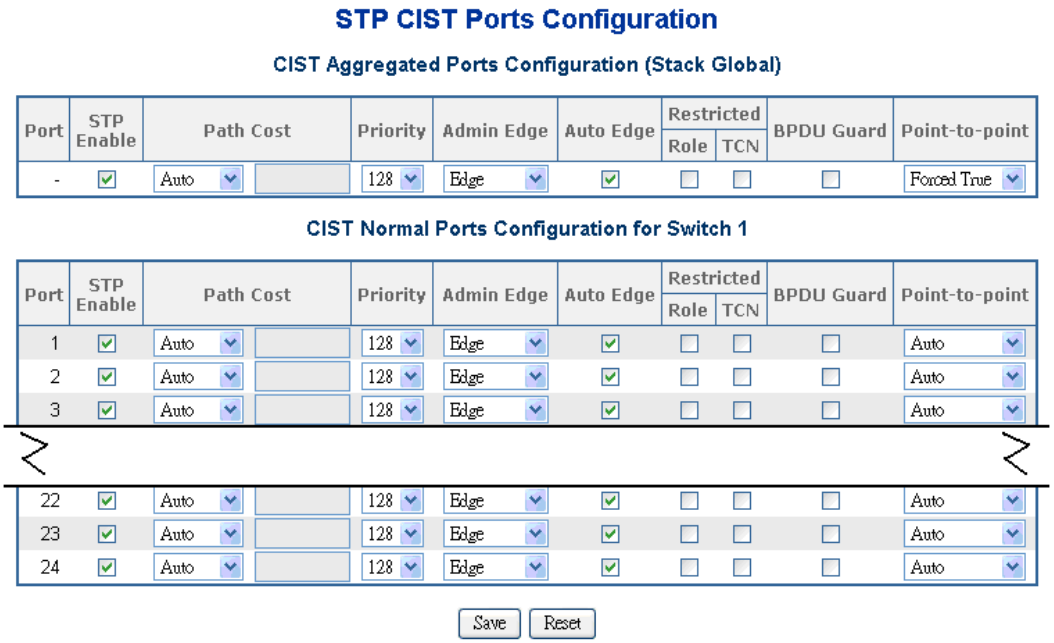


The page includes the following fields:

Object	Description
MSTI	The Bridge Instance. This is also a link to the STP Detailed Bridge Status.
Bridge ID	The Bridge ID of this Bridge instance.
Root ID	The Bridge ID of the currently elected root bridge.
Root Port	The switch port currently assigned the root port role.
Root Cost	Root Path Cost. For the Root Bridge this is zero. For all other Bridges, it is the sum of the Port Path Costs on the least cost path to the Root Bridge.
Topology Flag	The current state of the Topology Change Flag for this Bridge instance.
Topology Change Last	The time since last Topology Change occurred.

4.7.4 CIST Port Configuration

This page allows the user to change and inspect the current STP CIST port configurations. This page contains settings for aggregations and physical ports. The aggregation settings are stack global. The RSTP port settings relate to the currently selected stack unit, as reflected by the page header.



The page includes the following fields:

Object	Description
Port	The switch port number of the logical STP port.
STP Enabled	Controls whether RSTP is enabled on this switch port.
Path Cost	Controls the path cost incurred by the port. The Auto setting will set the path cost as appropriate by the physical link speed. Using the Specific setting, a user-defined value can be entered.
Priority	Controls the port priority. This can be used to control priority of ports having identical port cost. (See above). • Default: 128 • Range: 0-240, in steps of 16
operEdge (state flag)	Operational flag describing whether the port is connecting directly to edge devices. (No Bridges attached).
AdminEdge	Controls whether the operEdge flag should start as set or cleared. (The initial operEdge state when a port is initialized).
AutoEdge	Controls whether the bridge should enable automatic edge detection on the bridge port.
Restricted Role	If enabled, causes the port not to be selected as Root Port for the CIST or any MSTI, even if it has the best spanning tree priority vector.
Restricted TCN	If enabled, causes the port not to propagate received topology change notifications and topology changes to other ports.
BPDU Guard	If enabled, causes the port to disable itself upon receiving valid BPDU's. Contrary to the similar bridge setting, the port Edge status does not affect this setting. A port entering error-disabled state due to this setting is subject to the bridge Port Error Recovery setting as well.
Point2Point	Controls whether the port connects to a point-to-point LAN rather than a shared medium. This can be automatically determined, or forced either true or false. Transitions to the forwarding state is faster for point-to-point LANs than for shared media. (This applies to physical ports only. Aggregations are always forced Point2Point).

Console: STP Port Configuration	
Description	Show STP Port configuration.
Syntax	`stp port configuration` ***[<port_list>]***

Parameters	***<port_list>***: Port list or 'all'. Port zero means aggregations.

Example:

Show STP status of Port1

```
SWITCH/>stp port configuration 1

Port  Mode     AdminEdge  AutoEdge   restrRole  restrTcn  bpduGuard  Point2point
----  -------  ---------- ---------- ---------- --------- ---------- -----------
1     Enabled  Enabled    Enabled    Disabled   Disabled  Disabled   Auto
```

Console: STP Port Mode	
Description	Set or show the STP enabling for a port.
Syntax	`stp port mode` ***[<port_list>]*** **[enable|disable]**
Parameters	***<port_list>***: Port list or 'all'. Port zero means aggregations. **Enable**: Enable MSTP protocol **Disable**: Disable MSTP protocol
Default Setting	Enable

Example:

Disable STP function on port1

```
SWITCH/>stp port mode 1 disable
```

Console: STP Port Edge	
Description	Set or show the STP adminEdge port parameter.
Syntax	`stp port edge` ***[<port_list>]*** **[enable|disable]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **Enable**: Configure MSTP adminEdge to Edge **Disable**: Configure MSTP adminEdge to Non-edge
Default Setting	Enable

Example:

Disable STP edge function on port1

```
SWITCH/>stp port edge 1 disable
```

Console: STP Port AutoEdge	
Description	Set or show the STP autoEdge port parameter.
Syntax	`stp port autoedge` ***[<port_list>]*** **[enable|disable]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **Enable**: Enable MSTP autoEdge **Disable**: Disable MSTP autoEdge
Default Setting	Enable

Example:

Disable STP edge function on port1

```
SWITCH/>stp port autoedge 1 disable
```

Console: STP BPDUFilter	
Description	Set or show edge port BPDU Filtering.
Syntax	`stp bpdufilter` **[enable|disable]**
Parameters	**enable|disable**: enable or disable BPDU Filtering for Edge ports
Default Setting	Disable

Example:

Set edge port BPDU filtering

```
SWITCH/>stp bpdufilter enable
```

Console: STP BPDU Guard	
Description	Set or show edge port BPDU Guard.
Syntax	`stp bpduguard` **[enable|disable]**
Parameters	**enable|disable**: enable or disable BPDU Guard for Edge ports
Default Setting	Disable

Example:

Set edge port BPDU guard

```
SWITCH/>stp bpduguard enable
```

Console: STP Port P2P	
Description	Set or show the STP point2point port parameter.
Syntax	`stp port p2p` ***[<port_list>]*** **[enable|disable|auto]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable MSTP point2point **disable**: Disable MSTP point2point **auto**: Automatic MSTP point2point detection
Default Setting	Auto

Example:

Disable STP P2P function on port1

```
SWITCH/>stp port p2p 1 disable
```

Console: STP Port RestrictedRole	
Description	Set or show the MSTP restrictedRole port parameter.
Syntax	`stp port restrictedrole` ***[<port_list>]*** **[enable|disable]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable MSTP restricted role **disable**: Disable MSTP restricted role
Default Setting	Disable

Example:

Disable STP restricted role on port1

```
SWITCH/>stp port restrictedrole 1 enable
```

Console: STP Port RestrictedTcn	
Description	Set or show the MSTP restrictedTcn port parameter.
Syntax	`stp port restrictedtcn` ***[<port_list>]*** **[enable|disable]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable MSTP restricted TCN **disable**: Disable MSTP restricted TCN
Default Setting	Disable

Example:

Disable STP restricted TCN on port1

```
SWITCH/>stp port restrictedtcn 1 enable
```

Console: STP Port RestrictedTcn	
Description	Set or show the bpduGuard port parameter.
Syntax	`stp port bpduguard` ***[<port_list>]*** **[enable|disable]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable port BPDU Guard **disable**: Disable port BPDU Guard
Default Setting	Disable

Example:

Disable BPDU guard on port1

```
SWITCH/>stp port bpduguard 1 enable
```

Console: STP Port Statistic	
Description	Show STP port statistics.
Syntax	`stp port statistics` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports

Example:

Show STP port statistics.

```
SWITCH/>stp port statistics
Port Rx MSTP Tx MSTP Rx RSTP Tx RSTP Rx STP Tx STP Rx TCN Tx TCN Rx Ill. Rx Unk.
------- ------- ------- ------- ------- ------ ------ ------ ------ ------- ----
14      0       579     0       0       0      0      0      0      0       0
```

Console: STP Port MigrationCheck	
Description	Set the STP mCheck (Migration Check) variable for ports.
Syntax	`stp port mcheck` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports

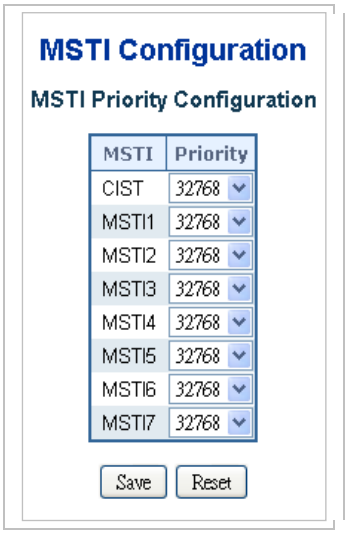
Example:

Set the STP mCheck (Migration Check) variable for port 1.

```
SWITCH/>stp port mcheck 1
```

4.6.5 MSTI Priorities

A MSTI port is a virtual port, which is instantiated separately for each active CIST (physical) port for each MSTI instance configured and applicable for the port. The MSTI Priority Configuration webpage allows the user to inspect the current STP MSTI bridge instance priority configurations, and possibly change them as well.



The page includes the following fields:

Object	Description
MSTI	The bridge instance. The CIST is the default instance, which is always active.
Priority	Controls the bridge priority. Lower numerical values have higher priority. The bridge priority plus the MSTI instance number, concatenated with the 6-byte MAC address of the switch forms a Bridge Identifier.

Console: STP MSTI Priority	
Description	Set or show the CIST/MSTI bridge priority.
Syntax	`stp msti priority` ***[<msti>] [<priority>]***
Parameters	***<msti>***: STP bridge instance no (0-7, CIST=0, MSTI1=1, ...) ***<priority>***: STP bridge priority (0/16/32/48/.../224/240)
Default Setting	MSTI Bridge Priority -------- ------ CIST 128 MST1 128 MST2 128 MST3 128 MST4 128 MST5 128 MST6 128 MST7 128

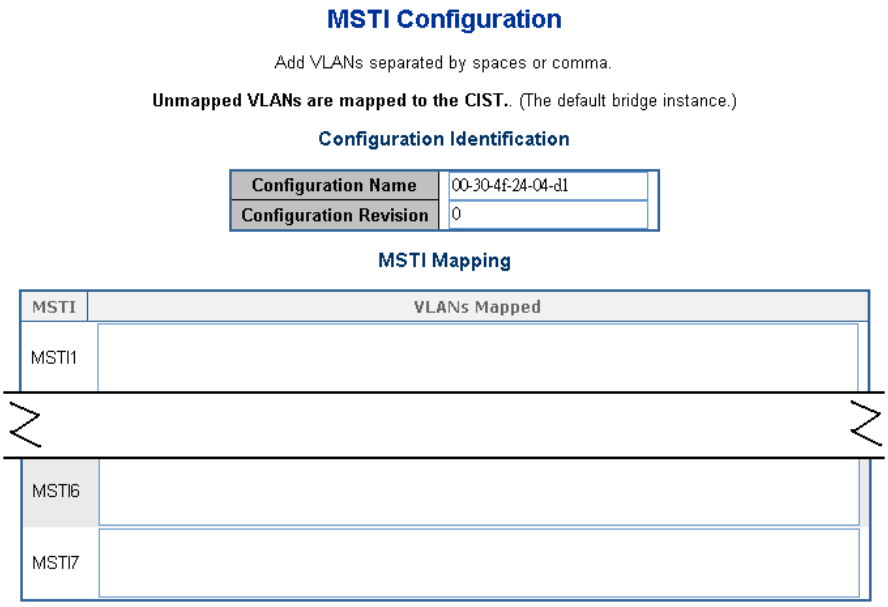
Example:

Set MST1 priority value in 48.

```
SWITCH/>stp msti priority 1 48
```

4.6.6 MSTI Configuration

Inspect and change the current STP MSTI bridge instance priority configurations.



The page includes the following fields:

- **Configuration Identification**

Object	Description
Configuration Name	The name identifying the VLAN to MSTI mapping. Bridges must share the name and revision (see below), as well as the VLAN-to-MSTI mapping configuration in order to share spanning trees for MSTI's. (Intra-region). The name is at most 32 characters.
Configuration Revision	The revision of the MSTI configuration named above. This must be an integer between ***0*** and ***65535***.

- **MSTI Mapping**

Object	Description
MSTI	The bridge instance. The CIST is not available for explicit mapping, as it will receive the VLANs not explicitly mapped.
VLANs Mapped	The list of VLAN's mapped to the MSTI. The VLANs must be separated with comma and/or space. A VLAN can only be mapped to one MSTI. An unused MSTI should be left empty. (I.e. not having any VLANs mapped to it.)

Console: STP CName	
Description	Set or Show MSTP configuration name and revision.
Syntax	`stp cname` ***[<config-name>] [<integer>]***
Parameters	***<config-name>***: MSTP Configuration name. A text string up to 32 characters long. Use quotes (") to embed spaces in name. ***<integer>***: Integer value
Default Setting	Configuration name: MAC address Configuration rev.: 0

Example:

Set MSTP configuration name and revision.

```
SWITCH/>stp cname 9f_SW-24400 1
```

Console: STP MSTI Map	
Description	Show or clear MSTP MSTI VLAN mapping configuration.
Syntax	`stp msti map` ***[<msti>]*** **`[clear]`**
Parameters	***<msti>***: STP bridge instance no (0-7, CIST=0, MSTI1=1, ...) **clear**: Clear VID to MSTI mapping

Example:

Add MST1 priority value in 48.

```
SWITCH/>stp msti priority 1 48
```

Console: STP MSTI Add	
Description	Add a VLAN to a MSTI.
Syntax	`stp msti add` ***<msti> <vid>***
Parameters	***<msti>***: STP bridge instance no (0-7, CIST=0, MSTI1=1, ...) ***<vid>***: VLAN ID (1-4095)

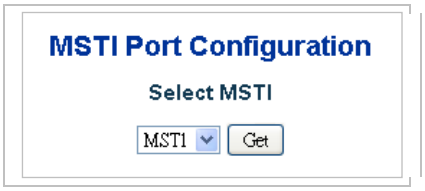
Example:

Add MST1 in vlan1.

```
SWITCH/>stp msti add 1 1
```

4.6.7 MSTI Ports Configuration

The MSTI instance must be selected before displaying actual MSTI port configuration options. This page contains MSTI port settings for physical and aggregated ports. The aggregation settings are stack global.



- **MSTI Port Configuration**

Object	Description
Select MSTI	Select the bridge instance and set more detail configuration.

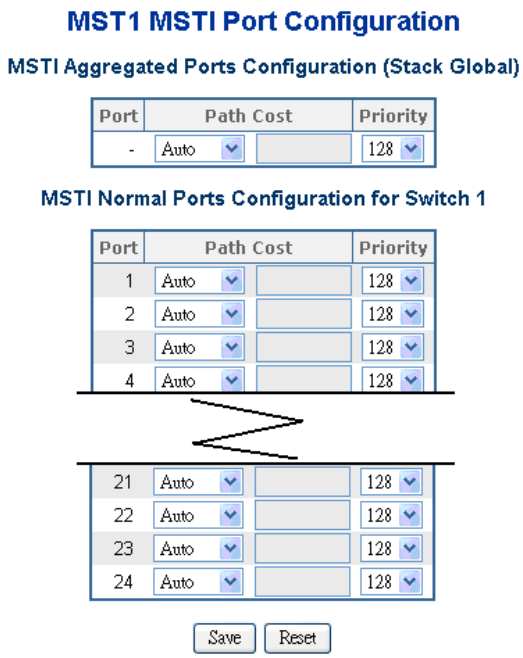


Figure 4-4 *- MST1/MSTi Port Configuration for the entire stack or for a specified switch*

The page includes the following fields:

➢ **MSTx MSTI Port Configuration**

Object	Description
Port	The switch port number of the corresponding STP CIST (and MSTI) port.
Path Cost	Controls the path cost incurred by the port. The Auto setting will set the path cost appropriate to the physical link speed. Using the Specific setting, a user-defined value can be entered. Valid values are in the range 1 to 200000000.
Priority	Controls the port priority.

Buttons

Get: Click to set MSTx configuration

Console: STP MSTI Priority	
Description	Set or show the CIST/MSTI bridge priority.
Syntax	`stp msti priority` ***[<msti>] [<priority>]***
Parameters	***<msti>***: STP bridge instance no (0-7, CIST=0, MSTI1=1, ...) ***<priority>***: STP bridge priority (0/16/32/48/.../224/240)
Default Setting	MSTI Bridge Priority -------- ------ CIST 128 MST1 128 MST2 128 MST3 128 MST4 128 MST5 128 MST6 128 MST7 128

Example:

Set MST1 priority value in 48.

```
SWITCH/>stp msti priority 1 48
```

Console: STP MSTI Map	
Description	Show or clear MSTP MSTI VLAN mapping configuration.
Syntax	`stp msti map` ***[<msti>]*** **[clear]**
Parameters	***<msti>***: STP bridge instance no (0-7, CIST=0, MSTI1=1, ...) **clear**: Clear VID to MSTI mapping

Example:

Add MST1 priority value in 48.

```
SWITCH/>stp msti priority 1 48
```

Console: STP MSTI Add	
Description	Add a VLAN to a MSTI.
Syntax	`stp msti add` ***<msti> <vid>***
Parameters	***<msti>***: STP bridge instance no (0-7, CIST=0, MSTI1=1, ...) ***<vid>***: VLAN ID (1-4095)

Example:

Add MST1 in vlan1.

```
SWITCH/>stp msti add 1 1
```

Console: STP MSTI Port Configuration	
Description	Show the STP CIST/MSTI port configuration.
Syntax	`stp msti port configuration` ***[<msti>] [<port_list>]***
Parameters	***<msti>***: STP bridge instance no (0-7, CIST=0, MSTI1=1, ...) ***<port_list>***: Port list or 'all', default: All ports
Default Setting	auto

Example:

Set MSTI2 in port1~2

```
SWITCH/>stp msti port configuration 2 1-2

MSTI  Port   Path Cost   Priority
----  ----   ----------  --------
MST2  Aggr   Auto        128

MSTI  Port  Path Cost   Priority
----  ----  ----------  --------
MST2  1     Auto        128
MST2  2     Auto        128
```

Console: STP MSTI Port Cost	
Description	Set or show the STP CIST/MSTI port path cost.
Syntax	`stp msti port cost` ***[<msti>] [<port_list>] [<path_cost>]***
Parameters	***<msti>***: STP bridge instance no (0-7, CIST=0, MSTI1=1, ...) ***<port_list>***: Port list or 'all'. Port zero means aggregations. ***<path_cost>***: STP port path cost (1-200000000) or 'auto'
Default Setting	auto

Example:

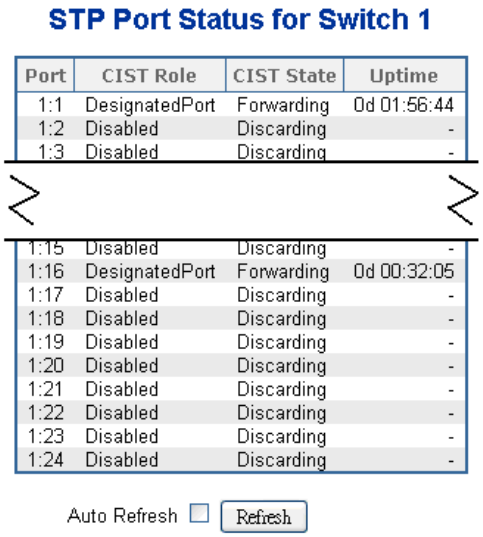
Set MSTI7 in port1

```
SWITCH/>stp msti port cost 7 1

MSTI   Port   Path Cost
----   ----   ----------
MST7   1      Auto
```

Console: STP MSTI Port Priority	
Description	Set or show the STP CIST/MSTI port priority.
Syntax	`stp msti port priority` ***[<msti>] [<port_list>] [<priority>]***
Parameters	***<msti>***: STP bridge instance no (0-7, CIST=0, MSTI1=1, ...) ***<port_list>***: Port list or 'all'. Port zero means aggregations. ***<priority>***: STP port priority (0/16/32/48/.../224/240)
Default Setting	128

4.6.8 Port Status

This page displays the STP CIST port status for physical ports in the currently selected switch.



The page includes the following fields:

Object	Description
Port	The switch port number of the logical STP port.
CIST Role	The current STP port role of the ICST port. The port role can be one of the following values: • **AlternatePort** • **BackupPort** • **RootPort** • **DesignatedPort**
State	The current STP port state of the CIST port. The port state can be one of the following values: • **Disabled** • **Blocking** • **Learning** • **Forwarding** • **Non-STP**
Uptime	The time since the bridge port was last initialized.

Console: STP Status	
Description	Show STP Bridge status.
Syntax	`stp status` ***[<msti>] [<port_list>]***
Parameters	***<msti>***: STP bridge instance no (0-7, CIST=0, MSTI1=1, ...) ***<port_list>***: Port list or 'all', default: All ports
Default Setting	Disable

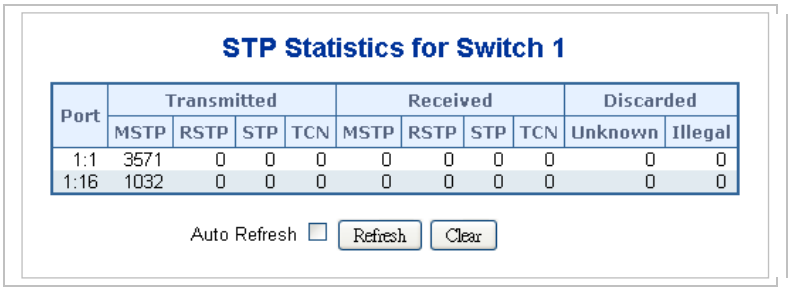
Example:

Show STP Bridge status.

```
SWITCH/>stp status
CIST Bridge STP Status
Bridge ID    : 80:00-00:30:4F:24:04:D1
Root ID      : 80:00-00:30:4F:24:04:D1
Root Port    : -
Root PathCost: 0
Regional Root: 80:00-00:30:4F:24:04:D1
Int. PathCost: 0
Max Hops     : 20
TC Flag      : Steady
TC Count     : 0
TC Last      : -
Port       Port Role       State       Pri  PathCost  Edge  P2P  Uptime
---------  --------------  ----------  ---  --------  ----  ---  -------------
14         DesignatedPort  Forwarding  128  20000     Yes   Yes  0d 00:10:32
```

4.6.9 Port Statistics

This page displays the STP port statistics counters for port physical ports in the currently selected switch.


STP Statistics for Switch 1
Port
Transmitted
Received
Discarded
MSTP RSTP STP TCN MSTP RSTP STP TCN Unknown Illegal
1:1 3571 0 0 0 0 0 0 0 0 0
1:16 1032 0 0 0 0 0 0 0 0 0
Auto Refresh
Refresh
Clear

The page includes the following fields:

Object	Description
Port	The switch port number of the logical RSTP port.
RSTP	The number of RSTP Configuration BPDU's received/transmitted on the port.
STP	The number of legacy STP Configuration BPDU's received/transmitted on the port.
TCN	The number of (legacy) Topology Change Notification BPDU's received/transmitted on the port.
Discarded Unknown	The number of unknown Spanning Tree BPDU's received (and discarded) on the port.
Discarded Illegal	The number of illegal Spanning Tree BPDU's received (and discarded) on the port.

4.7 Multicast

4.7.1 IGMP Snooping

Each page shows up to 999 entries from the Dynamic ARP Inspection table memberships. IGMP snooping is a switch feature that monitors the exchange of IGMP messages and copies them to the CPU for feature processing. The overall purpose of IGMP Snooping is to limit the forwarding of multicast frames to only ports that are a member of the multicast group.

4.7.2 IGMP Snooping Configuration

This page provides IGMP Snooping related configuration. Most of the settings are global, whereas the Router Port configuration is related to the currently selected stack unit, as reflected by the page header.

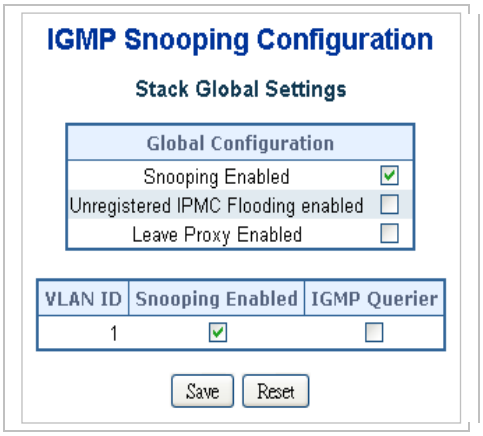


***Figure 4-5** - IGMP Snooping Configuration (Global settings)*

The page includes the following fields:

Object	Description
Snooping Enabled	Enable Global IGMP Snooping.
Unregistered IPMC Flooding enabled	Enable unregistered IPMC traffic flooding.
Leave Proxy Enable	Enable leave proxy.
VLAN ID	The VLAN ID of the entry.
Snooping Enabled	Enable per-VLAN IGMP Snooping.
IGMP Querier	Enable the IGMP Querier in the VLAN. The Querier will send out if no Querier received in 255 seconds after IGMP Querier Enabled. Each Querier's interval is 125 second, and it will stop acting as an IGMP Querier upon receiving any Querier from other devices.

Console: IGMP Configuration	
Description	Show IGMP snooping configuration.
Syntax	`igmp configuration` **`[<port_list>]`**
Parameters	***<port_list>***: Port list or 'all', default: All ports

Example:

Show IGMP snooping configuration.

```
SWITCH/>igmp configuration
```

Console: IGMP Mode	
Description	Set or show the IGMP snooping mode.
Syntax	`igmp mode` **`[enable|disable]`**
Parameters	**enable** : Enable IGMP snooping **disable**: Disable IGMP snooping (default: Show IGMP snooping mode)
Default Setting	Disable

Example:

Enable IGMP mode

```
SWITCH/>igmp mode enable
```

Console: IGMP Flooding	
Description	Set or show the IGMP snooping unregistered flood operation.
Syntax	`igmp flooding` **`[enable|disable]`**
Parameters	**enable** : Enable IGMP flooding **disable**: Disable IGMP flooding (default: Show IGMP flood mode)
Default Setting	disable

Example:

Enable IGMP flooding function

```
SWITCH/>igmp flooding enable
```

Console: IGMP Leave Proxy	
Description	Set or show the mode of IGMP Leave Proxy.
Syntax	`igmp leave proxy` **`[enable|disable]`**
Parameters	**enable** : Enable IGMP Leave Proxy **disable**: Disable IGMP Leave Proxy (default: Show IGMP snooping mode)
Default Setting	Disable

Example:

Enable IGMP leave proxy

```
SWITCH/>igmp leave proxy enable
```

Console: IGMP Querier	
Description	Set or show the IGMP snooping querier mode for VLAN.
Syntax	`igmp querier` **`[<vid>] [enable|disable]`**
Parameters	***<vid>***: VLAN ID (1-4095), default: Show all VLANs **enable**: Enable IGMP querier **disable**: Disable IGMP querier (default: Show IGMP querier mode)
Default Setting	Disable

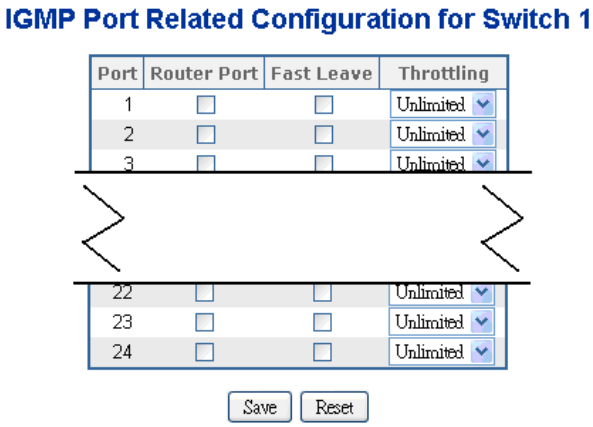
Example:

Enable the IGMP snooping querier mode for VLAN.

```
SWITCH/>igmp querier 1 enable
```

4.7.3 IGMP Port Related Configuration

This page provides IGMP Snooping related configuration. Most of the settings are global, whereas the Router Port configuration is related to the currently selected stack unit, as reflected by the page header.



The page includes the following fields:

Object	Description
Router Port	Specify which ports act as router ports. If an aggregation member port is selected as a router port, the whole aggregation will act as a router port.
Fast Leave	Enable Fast Leave on the port.
Throttling	Enable to limit the number of multicast groups to which a switch port can belong.

Console: IGMP Router	
Description	Set or show the IGMP snooping router port mode.
Syntax	`igmp router` ***[<port_list>]*** **`[enable|disable]`**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable** : Enable IGMP router port **disable** : Disable IGMP router port (default: Show IGMP router port mode)
Default Setting	No filtering

Example:

Enable IGMP snooping function for port1~4

```
SWITCH/>igmp router 1-4 enable
```

Console: IGMP Fastleave	
Description	Set or show the IGMP snooping fast leave port mode.
Syntax	`igmp fastleave` **`[`*`<port_list>`*`] [enable|disable]`**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable IGMP fast leave **disable**: Disable IGMP fast leave (default: Show IGMP fast leave mode)

Default Setting	Disable

Example:

Enable the IGMP snooping fast leave port mode.

```
SWITCH/>igmp fastleave 1 enable
```

Console: IGMP Throttling	
Description	Set or show the IGMP port throttling status.
Syntax	`igmp throttling` **[*<port_list>*] [limit-group-number]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **0**: No limit **1~10**: Group learn limit (default: Show IGMP Port Throttling)
Default Setting	unlimited

Example:

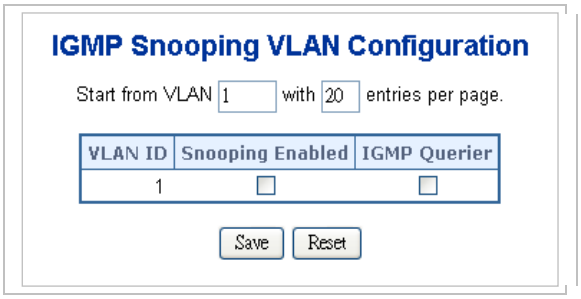
Set the IGMP port throttling status for port 1.

```
SWITCH/>igmp throttling 1 10
```

4.7.4 IGMP Snooping VLAN Configuration

Each page shows up to 999 entries from the VLAN table, default being 20, selected through the "entries per page" input field. When first visited, the web page will show the first 20 entries from the beginning of the VLAN Table. The first displayed will be the one with the lowest VLAN ID found in the VLAN Table.

The "VLAN" input fields allow the user to select the starting point in the VLAN Table.



The page includes the following fields:

Object	Description
VLAN ID	The VLAN ID of the entry.
IGMP Snooping Enable	Enable the per-VLAN IGMP Snooping. Only up to 64 VLANs can be selected.
IGMP Querier	Enable the IGMP Querier in the VLAN. The Querier will send out if no Querier received in 255 seconds after IGMP Querier Enabled. Each Querier's interval is 125 second, and it will stop act as an IGMP Querier if received any Querier from other devices.

Buttons

Refresh: Refreshes the displayed table starting from the "VLAN" input fields.

<<: Updates the table starting from the first entry in the VLAN Table, i.e. the entry with the lowest VLAN ID.

>>: Updates the table, starting with the entry after the last entry currently displayed.

Console: IGMP State	
Description	Set or show the IGMP snooping state for VLAN.
Syntax	`igmp state [<vid>] [enable|disable]`
Parameters	***<vid>***: VLAN ID (1-4095), default: Show all VLANs **enable** : Enable IGMP snooping **disable**: Disable IGMP snooping (default: Show IGMP snooping mode)
Default Setting	Disable

Example:

Disable VID 1

```
SWITCH/>igmp state 1 disable
```

4.7.5 Port Group Filtering

IGMP filtering enables you to assign a profile to a switch port that specifies multicast groups that are permitted or denied on the port. An IGMP filter profile can contain one or more, or a range of multicast addresses; but only one profile can be assigned to a port. When enabled, IGMP join reports received on the port are checked against the filter profile. If a requested multicast group is permitted, the IGMP join report is forwarded as normal. If a requested multicast group is denied, the IGMP join report is dropped.

IGMP throttling sets a maximum number of multicast groups that a port can join at the same time. When the maximum number of groups is reached on a port, the switch can take one of two actions; either "deny" or "replace". If the action is set to deny, any new IGMP join reports will be dropped. If the action is set to replace, the switch randomly removes an existing group and replaces it with the new multicast group.

Figure 4-6 *- IGMP Snooping Port Group Filtering Configuration for a switch in a stack (no groups added)*

The page includes the following fields:

Object	Description

Delete	Check to delete the entry. It will be deleted during the next save.
Port	The logical port for the settings.
Filtering Group	The IP Multicast Group that will be filtered.

Buttons

Delete: Check to delete the entry.

Add new Filtering Group: Click to add a new entry to the Group Filtering table.

Console: IGMP Groups	
Description	Show IGMP groups.
Syntax	`igmp groups` ***[<vid>]***
Parameters	***<vid>****:* VLAN ID (1-4095)

Console: IGMP Filtering	
Description	Set or show the IGMP port group filtering list.
Syntax	`igmp filtering` **[*<port_list>*] [add|del] [group_addr]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **add** : Add new port group filtering entry **del** : Del existing port group filtering entry (default: Show IGMP port group filtering list) IP multicast group address (a.b.c.d)
Default Setting	No filtering

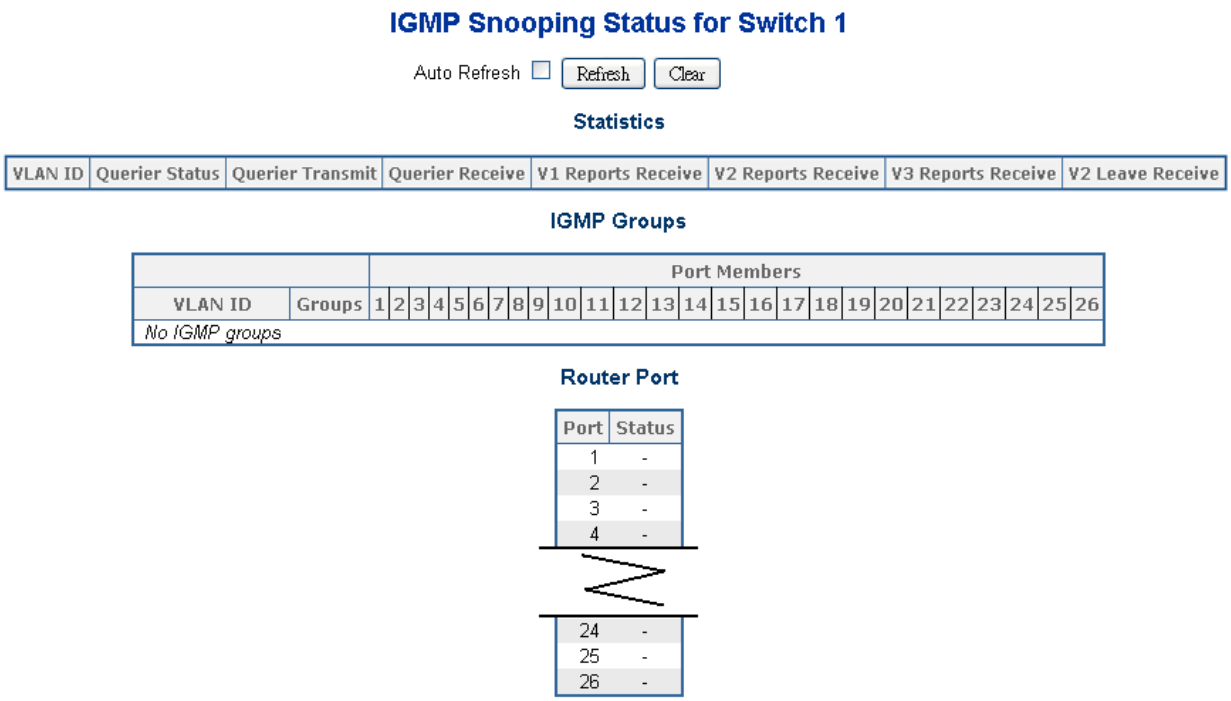
Example:

Set the IGMP port group filtering list for port 1.

```
SWITCH/>igmp filtering 1 add 239.0.0.1
```

4.7.6 IGMP Snooping Status

This page provides IGMP Snooping status divided into statistics, IGMP groups and ports. The page reflects the status of the currently selected stack unit, as reflected by the page header.



The page includes the following fields:

Object	Description
VLAN ID	The VLAN ID of the entry.
Groups	The present IGMP groups. Max. 128 groups for each VLAN.
Port Members	The ports that are members of the entry.
Querier Status	Show the Querier status is "ACTIVE" or "IDLE".
Querier Transmit	The number of Transmitted Querier.
Querier Receive	The number of Received Querier.
V1 Reports Receive	The number of Received V1 Reports.
V2 Reports Receive	The number of Received V2 Reports.
V3 Reports Receive	The number of Received V3 Reports.
V2 Leave Receive	The number of Received V2 Leave.

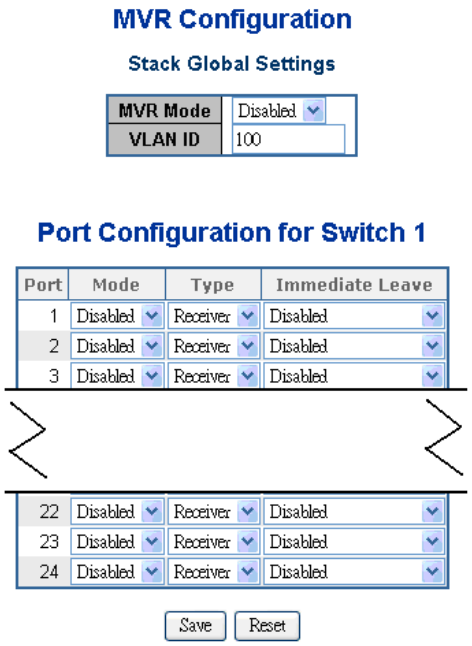
Console: IGMP Status	
Description	Show IGMP status.
Syntax	`igmp status` **[*<vid>*]**
Parameters	***<vid>***: VLAN ID (1-4095)
Default Setting	disable

4.7.7 MVR Configuration

In multicast VLAN networks, subscribers to a multicast group can exist in more than one VLAN. Multicast VLAN Registration (MVR) is a protocol for Layer 2 (IP)-networks that enables multicast-traffic from a source VLAN to be shared with subscriber-VLANs. Multicast VLAN Registration (MVR) routes packets received in a multicast source VLAN to one or more receive VLANs. Clients are in the receive VLANs and the multicast server is in the source VLAN.

MVR saves bandwidth by preventing duplicate multicast streams being sent in the core network. Instead the stream(s) are received

on the MVR-VLAN and forwarded to the VLANs where hosts have requested it/them. This page provides global MVR related configuration.



The page includes the following fields:

Object	Description
MVR Mode	Enable/Disable the Global MVR.
VLAN ID	Specify the Multicast VLAN ID.
Mode	Enable MVR on the port.
Type	Specify the MVR port type on the port.
Immediate Leave	Enable the fast leave on the port.

Console: MVR Configuration	
Description	Show the MVR configuration.
Syntax	`mvr configuration`

Example:

Show the MVR configuration.

```
SWITCH/>mvr configuration

MVR Configuration:
==================

MVR Mode: Disabled
Multicast VLAN ID: 100

Port   Port Mode    Port Type    Immediate Leave
----    ----------      ----------      ---------------
1      Disabled     Receive      Disabled
2      Disabled     Receive      Disabled
3      Disabled     Receive      Disabled
4      Disabled     Receive      Disabled
5      Disabled     Receive      Disabled
6      Disabled     Receive      Disabled
7      Disabled     Receive      Disabled
8      Disabled     Receive      Disabled
9      Disabled     Receive      Disabled
```

```
10    Disabled     Receive      Disabled
11    Disabled     Receive      Disabled
12    Disabled     Receive      Disabled
13    Disabled     Receive      Disabled
14    Disabled     Receive      Disabled
15    Disabled     Receive      Disabled
16    Disabled     Receive      Disabled
17    Disabled     Receive      Disabled
18    Disabled     Receive      Disabled
19    Disabled     Receive      Disabled
20    Disabled     Receive      Disabled
21    Disabled     Receive      Disabled
22    Disabled     Receive      Disabled
23    Disabled     Receive      Disabled
24    Disabled     Receive      Disabled
```

Console: MVR Mode	
Description	Set or show the MVR mode.
Syntax	`mvr mode` **`[enable|disable]`**
Parameters	**enable**: Enable MVR mode **disable**: Disable MVR mode (default: Show MVR mode)
Default Setting	disable

Example:

Enable MVR mode.

```
SWITCH/>mvr mode enable
```

Console: MVR Multicast VLAN	
Description	Set or show MVR multicast VLAN ID.
Syntax	`mvr multicast vlan` ***[<vid>]***
Parameters	***<vid>***: VLAN ID (1-4095), default: Show current MVR multicast VLAN ID
Default Setting	100

Example:

Set VLAN 1000 for MVR multicast VLAN ID.

```
SWITCH/>mvr multicast vlan 1000
```

Console: MVR Port Mode	
Description	Set or show the MVR port mode.
Syntax	`mvr port mode` ***[<port_list>]*** **`[enable|disable]`**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable** : Enable MVR mode **disable** : Disable MVR mode (default: Show MVR mode)
Default Setting	disable

Example:

Enable the MVR port mode for port 1-4.

```
SWITCH/>mvr port mode 1-4 enable
```

Console: MVR Port Type	
Description	Set or show MVR port type.
Syntax	`mvr port type` ***[<port_list>]*** **`[source|receiver]`**

Parameters	***<port_list>***: Port list or 'all', default: All ports **source**: Enable source mode **receiver**: Disable receiver mode (default: Show MVR port type)
Default Setting	receiver

Example:

Set source type for MVR port type of port 1.

```
SWITCH/>mvr port type 1 source
```

Console: MVR Immediate Leave	
Description	Set or show MVR port state about immediate leave.
Syntax	`mvr immediate leave [<port_list>] [enable|disable]`
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable Immediate-leave mode **disable**: Disable Immediate-leave mode (default: Show MVR Immediate-leave mode)
Default Setting	disable

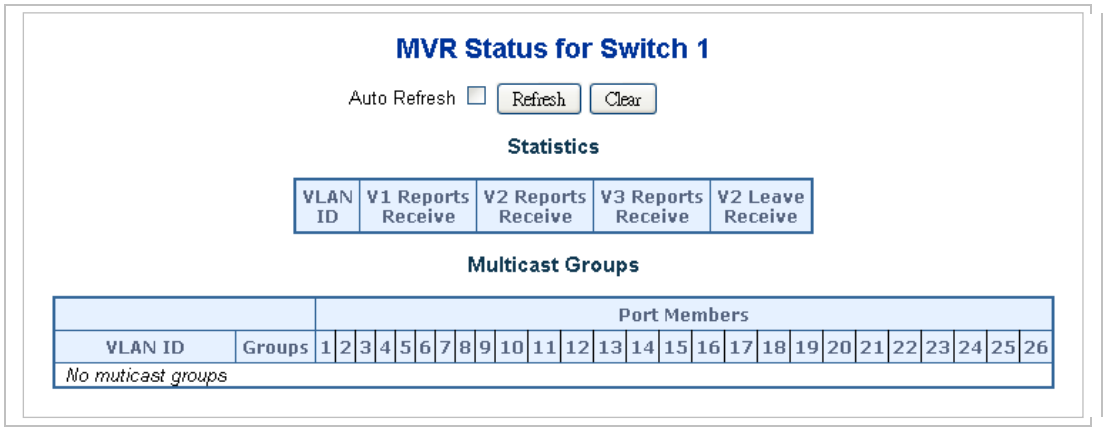
Example:

Enable MVR port state about immediate leave for port 1.

```
SWITCH/>mvr immediate leave 1 enable
```

4.7.8 MVR Status

This page provides MVR status for a switch.



The page includes the following fields:

Object	Description
Group	The present multicast groups. Max. 128 groups in the multicast VLAN.
Port Members	The ports that are members of the entry.
V1 Reports Receive	The number of Received V1 Reports.
V2 Reports Receive	The number of Received V2 Reports.
V3 Reports Receive	The number of Received V3 Reports.
V2 Leave Receive	The number of Received V2 Leave.

Console: MVR Group	
Description	Show the MVR group.
Syntax	`mvr group`

Console: MVR Status	
Description	Show the MVR status.
Syntax	`mvr status`

4.8 Quality of Service

Quality of Service (QoS) is an advanced traffic prioritization feature that allows you to establish control over network traffic. QoS enables you to assign various grades of network service to different types of traffic, such as multi-media, video, protocol-specific, time critical, and file-backup traffic.

A Policy, in terms of QoS is a set of "rules" that are applied to a network according to traffic priority. Rules comprise a service level and a classifier to define how the Switch will treat certain classes of traffic. A QoS Profile, subsequently, is multiple sets of rules which can be applied to a port.

To implement QoS on your network, you need to carry out the following actions:

1. Define a service level to determine the priority that will be applied to a set of traffic.
2. Apply a classifier to determine how the incoming traffic will be classified and thus treated by the Switch. Traffic classifications are determined by protocol, application, source, destination, and so on. You can create and modify classifications. The Switch then groups classified traffic in order to schedule them with the appropriate service level.
3. Create a QoS profile (sets of rules) which associates a service level and a classifier.
4. Apply a QoS profile to one or more ports.

For any given QCL, the following QCEs may be adjusted:

- Frames can be classified by 4 different QoS classes: **Low**, **Normal**, **Medium**, and **High**.
- The classification is controlled by a QoS assigned to each port.
- A QCL consists of an ordered list of up to 12 QCEs.
- Each QCE can be used to classify certain frames to a specific QoS class.
- This classification can be based on parameters such as VLAN ID, UDP/TCP port, IPv4/IPv6 DSCP or Tag Priority. Frames not matching any of the QCEs are classified to the default QoS Class for the port.

4.8.1 QCL Configuration Wizard

The wizard accessible from the webpage helps you set up a QCL quickly.

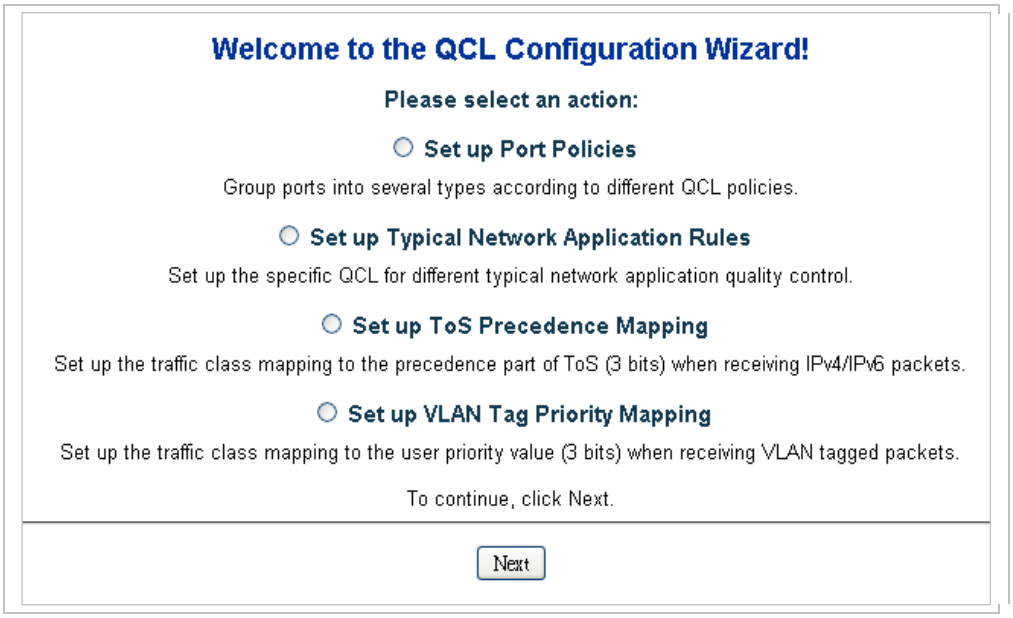

Welcome to the QCL Configuration Wizard!
Please select an action:
Set up Port Policies
Group ports into several types according to different QCL policies.
Set up Typical Network Application Rules
Set up the specific QCL for different typical network application quality control.
Set up ToS Precedence Mapping
Set up the traffic class mapping to the precedence part of ToS (3 bits) when receiving IPv4/IPv6 packets.
Set up VLAN Tag Priority Mapping
Set up the traffic class mapping to the user priority value (3 bits) when receiving VLAN tagged packets.
To continue, click Next.
Next

***Figure 4-7** - The first page of the QCL Configuration Wizard*

The page includes the following fields:

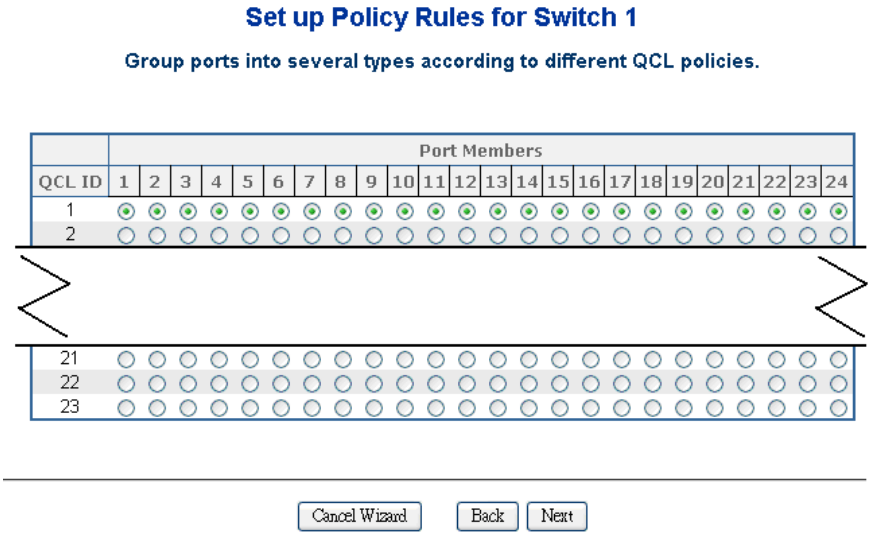
Object	Description
Set up Port Policies	Group ports into several types according to different QCL policies.
Set up Typical Network Application Rules	Set up the specific QCL for different typical network application quality control.
Set up ToS Precedence Mapping	Set up the traffic class mapping to the precedence part of ToS (3 bits) when receiving IPv4/IPv6 packets.
Set up VLAN Tag Priority Mapping	Set up the traffic class mapping to the User Priority value (3 bits) when receiving VLAN tagged packets.

Buttons

Next: Click to continue the wizard.

4.8.1.1 Set up Policy Rules

Group ports into several types according to different QCL policies. The settings relate to the currently selected stack unit, as reflected by the page header.


Set up Policy Rules for Switch 1
Group ports into several types according to different QCL policies.
Port Members
QCL ID
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
1
2
21
22
23
Cancel Wizard
Back
Next

The page includes the following fields:

Object	Description
QCL ID	Frames that hit this QCE are set to match this specific QCL.
Port Members	A row of radio buttons for each port is displayed for each QCL ID. To include a port in a QCL member, click the radio button.

Buttons

Cancel Wizard: Click to start the wizard again.

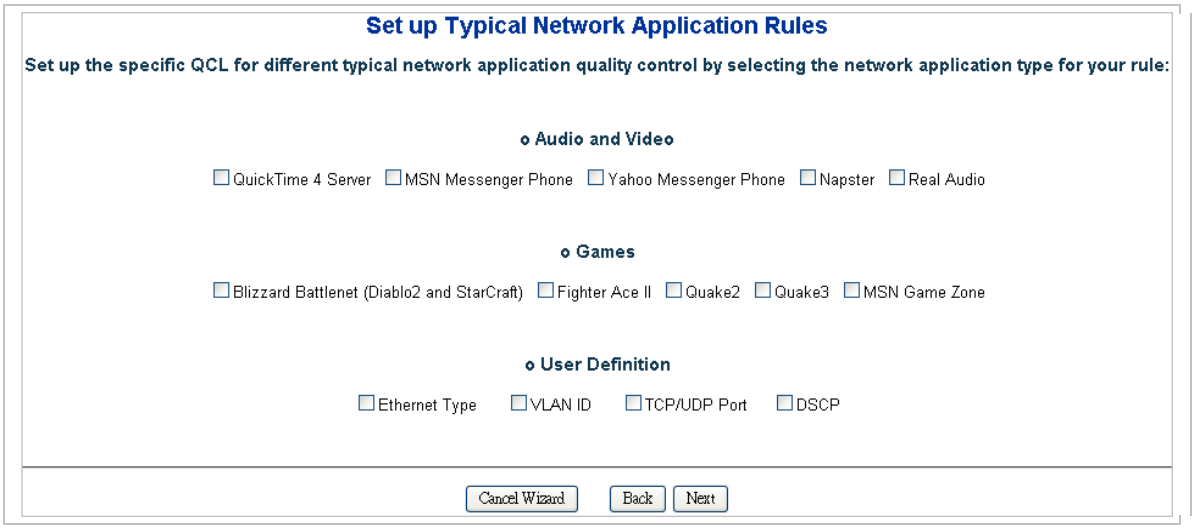
Back: Click to get more information.

Next: Click to continue the wizard.

Once the QCL configuration wizard is finished, a confirmation message is displayed. Click **Finish** to confirm your settings and **Wizard Again** to reconfigure QCL.

4.8.1.2 Network Application Rules

Set up the specific QCL for different typical network application quality control by selecting the network application type for your rule.



The page includes the following fields:

Object	Description
Audio and Video	Indicates the common servers that apply to the specific QCE.
Games	Indicates the common games that apply to the specific QCE.
User Definition	Indicates the user definition that applies to the specific QCE. The user definitions are: • **Ethernet Type**: Specify the Ethernet Type filter for this QCE. The allowed range is ***0x600*** to ***0xFFFF***. • **VLAN ID**: The VLAN ID filter for this QCE. The allowed range is ***1*** to ***4095***. • **UDP/TCP Port**: Specify the TCP/UDP port filter for this QCE. The allowed range is ***0*** to ***65535***. • **DSCP**: Specify the DSCP filter for this QCE. The allowed range is ***0*** to ***63***.

Buttons

Cancel Wizard: Click to cancel the wizard.

Back: Click to go back to the previous wizard step.

Next: Click to continue the wizard.

The wizard will create specific QCEs (QoS Control Entries) automatically in accordance to the selections on the previous page.

First select the QCL ID for these QCEs, and then select the traffic class. Different parameter options are displayed depending on the frame type that you selected.

The page includes the following fields:

Object	Description
QCL ID	Select the QCL ID to which these QCEs apply.
Traffic Class	Select a traffic class of ***Low***, ***Normal***, ***Medium***, or ***High*** to apply to the QCE.

Buttons

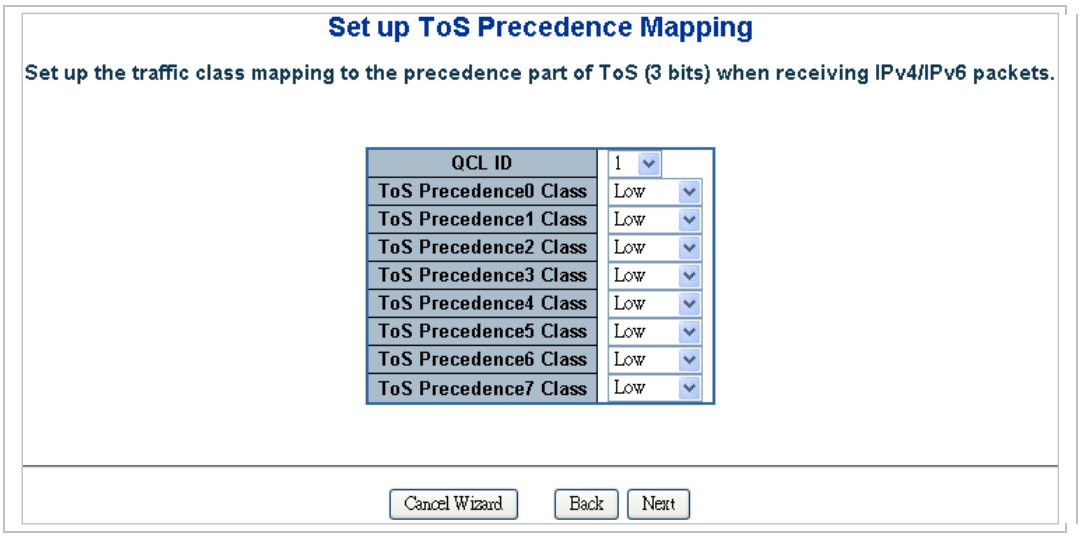
Cancel Wizard: Click to cancel the wizard.

Back: Click to go back to the previous wizard step.

Next: Click to continue the wizard.

4.8.1.3 ToS Precedence Mapping

Set up the traffic class mapping to the precedence part of ToS (3 bits) when receiving IPv4/IPv6 packets.



The page includes the following fields:

Object	Description
QCL ID	Select the QCL ID to which this QCE applies.
ToS Precedence Class	Select a traffic class of ***Low***, ***Normal***, ***Medium***, or ***High*** to apply to the QCE.

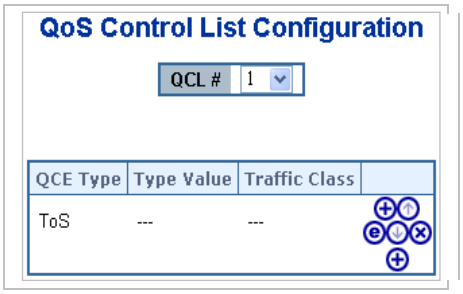
Buttons

Cancel Wizard: Click to cancel the wizard.

Back: Click to go back to the previous wizard step.

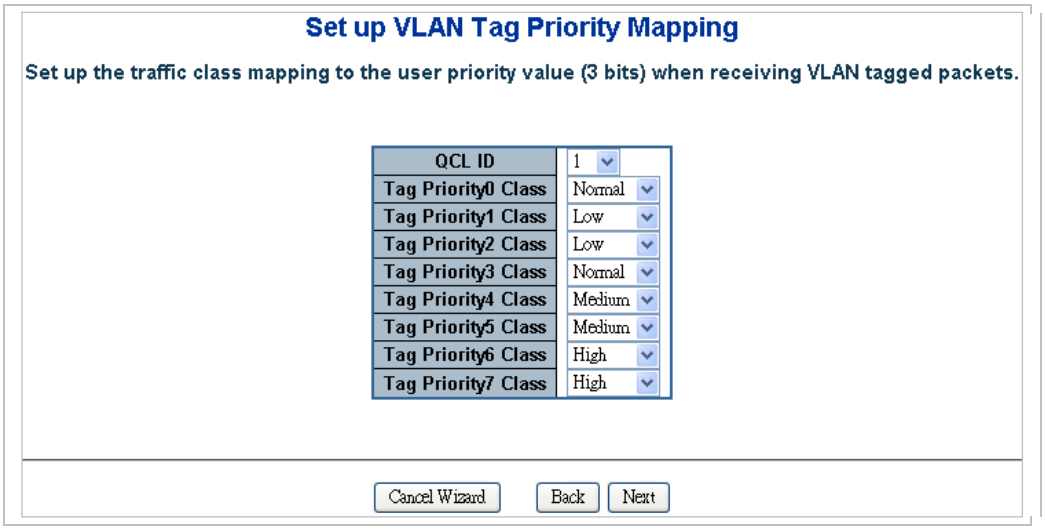
Next: Click to continue the wizard.

The QCL configuration wizard is finished, and the new configuration is ready for use, and the list of QCEs will appear in the screen below.



4.8.1.4 Set up VLAN Tag Priority Mapping

Set up the traffic class mapping to the User Priority value (3 bits) when receiving VLAN tagged packets.



The page includes the following fields:

Object	Description
QCL ID	Select the QCL ID to which this QCE applies.
VLAN Priority Class	Select a traffic class of ***Low***, ***Normal***, ***Medium***, or ***High*** to apply to the QCE.

Buttons

Cancel Wizard: Click to cancel the wizard.

Back: Click to go back to the previous wizard step.

Next: Click to continue the wizard.

The QCL configuration wizard is finished, and the new configuration is ready for use.

Console: QoS Classes	
Description	Set or show the number of traffic classes.
Syntax	`qos classes [<class>]`
Parameters	***<class>***: Number of traffic classes (1,2 or 4)
Default Setting	4

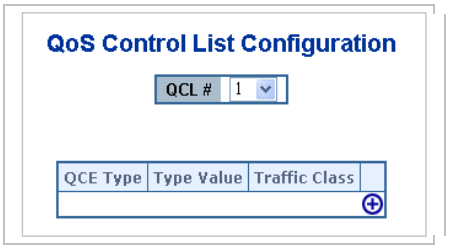
Example:

Set QoS classes 2

```
SWITCH/>qos classes 2
```

4.8.2 QoS Control List Configuration

Manage the QCEs for a given QCL.



The page includes the following fields:

Object	Description
QCL #	• Select a QCL to display a table that lists all the QCEs for that particular QCL.
QCE Type	Specifies which frame field the QCE processes to determine the QoS class of the frame. The following QCE types are supported: • **Ethernet Type**: The Ethernet Type field. If frame is tagged, this is the Ethernet Type that follows the tag header. • **VLAN ID**: VLAN ID. Only applicable if the frame is VLAN tagged. • **TCP/UDP Port**: IPv4 TCP/UDP source/destination port. • **DSCP**: IPv4 and IPv6 DSCP. • **ToS**: The 3 precedence bit in the ToS byte of the IPv4/IPv6 header (also known as DS field). • **Tag Priority**: User Priority. Only applicable if the frame is VLAN tagged or priority tagged.
Type Value	Indicates the value according to its QCE type. • **Ethernet Type**: The field shows the Ethernet Type value. • **VLAN ID**: The field shows the VLAN ID. • **TCP/UDP Port**: The field shows the TCP/UDP port range. • **DSCP**: The field shows the IPv4/IPv6 DSCP value.
Traffic Class	• The QoS class associated with the QCE.
Modification Buttons	You can modify each QCE in the table using the following buttons: • : Inserts a new QCE before the current row. • : Edits the QCE. • : Moves the QCE up the list. • : Moves the QCE down the list. • : Deletes the QCE. • : The lowest plus sign adds a new entry at the bottom of the list of QCL.

Console: QoS QCL Delete	
Description	Delete QCE.
Syntax	`qos qcl delete` ***<qcl_id> <qce_id>***
Parameters	***<qcl_id>***: QCL ID ***<qce_id>***: QCE ID (1-24)

Console: QoS QCL Lookup	
Description	Lookup QCE.
Syntax	`qos qcl lookup` ***[<qcl_id>] [<qce_id>]***
Parameters	***<qcl_id>***: QCL ID ***<qce_id>***: QCE ID (1-24)

Console: QoS QCL Mode	
Description	Set or show the port egress scheduler mode.
Syntax	`qos mode [<port_list>] [strict|weighted]`
Parameters	***<port_list>***: Port list or 'all', default: All ports **strict**: Strict mode **weighted**: Weighted mode (default: Show QoS mode)
Default Setting	Strict

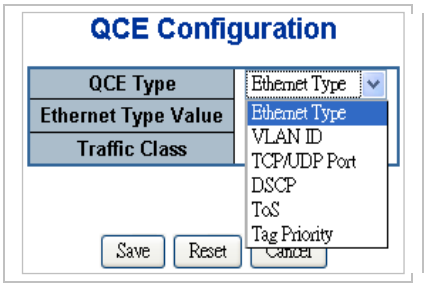
Example:

Set weighted mode for port15

```
SWITCH/>qos mode 15 weighted
```

4.8.2.1 QoS Control Entry Configuration

To add a new QCE, configure a new QoS Control Entry.



The page includes the following fields:

Object	Description
QCE Type	Select the available type for the specific QCE. • **Ethernet Type**: Matches the received frame's EtherType against the QCE Key. • **VLAN ID**: Matches the frame's VID against the QCE Key. • **TCP/UDP Port**: Matches the destination port and the source port against the QCE Key. • **DSCP**: Matches the received IPv4/IPv6 DSCP value (6 bits) against the two DSCP values in the QCE Key. • **ToS**: Uses the precedence part of the IPv4/IPv6 ToS (3 bits) as an index to the eight QoS Class values in the QCE Key. • **Tag Priority**: Uses the User Priority value (3 bits) as an index to the eight QoS Class values in the QCE Key.
Type Value	Configure the values according to the QCE type you select. • **Ethernet Type**: The allowed values for this type range from 0x600 (1536) to 0xFFFF (65535). • **VLAN ID**: The allowed values for this type range from 1 to 4095. • **TCP/UDP Port Range**: Specify whether there is a range or a specific port number. The port range allowed is from 0 to 65535. • **DSCP**: The allowed range is 0 to 63. ToS or Tag Priority do not have type value settings.
Traffic Class	Select a traffic class of **Low**, **Normal**, **Medium**, or **High** to apply to the QCE. If the QCE type is ToS or Tag Priority, there are 8 rows of traffic class that can be configured for each priority.

Buttons

Cancel: Return to the previous page.

Console: QoS QCL Add	
Description	Add or modify QoS Control Entry (QCE). If parameter <qce_id> is specified and an entry with this ID already exists, the QCE will be modified. Otherwise, a new QCE will be added; else if not specified, the next available QCE ID will be used. If the parameter <qce_id_next> is specified, the QCE will be placed before this QCE in the list; else if not specified, the QCE will be placed last in the list.
Syntax	`qos qcl add` ***[<qcl_id>] [<qce_id>] [<qce_id_next>]*** (**etype** ***<etype>***) | (**vid** ***<vid>***) | (**port** ***<udp_tcp_port>***) | (**dscp** ***<dscp>***) |(**tos** ***<tos_list>***) | (**tag_prio** ***<tag_prio_list>***) ***<class>***
Parameters	***<qcl_id>***: QCL ID ***<qce_id>***: QCE ID (1-24) ***<qce_id_next>***: Next QCE ID (1-24) **etype**: Ethernet Type keyword ***<etype>***: Ethernet Type **vid**: VLAN ID keyword ***<vid>***: VLAN ID (1-4095) **port**: UDP/TCP port keyword ***<udp_tcp_port>***: Source or destination UDP/TCP port (0-65535) **dscp**: IP DSCP keyword ***<dscp>***: IP DSCP (0-63) **tos**: IP ToS keyword ***<tos_list>***: IP ToS list (0-7) **tag_prio**: VLAN tag priority keyword ***<tag_prio_list>***: VLAN tag priority list (0-7) ***<class>***: Traffic class low/normal/medium/high or 1/2/3/4

4.8.3 Port QoS Configuration

Configure QoS settings for each port.

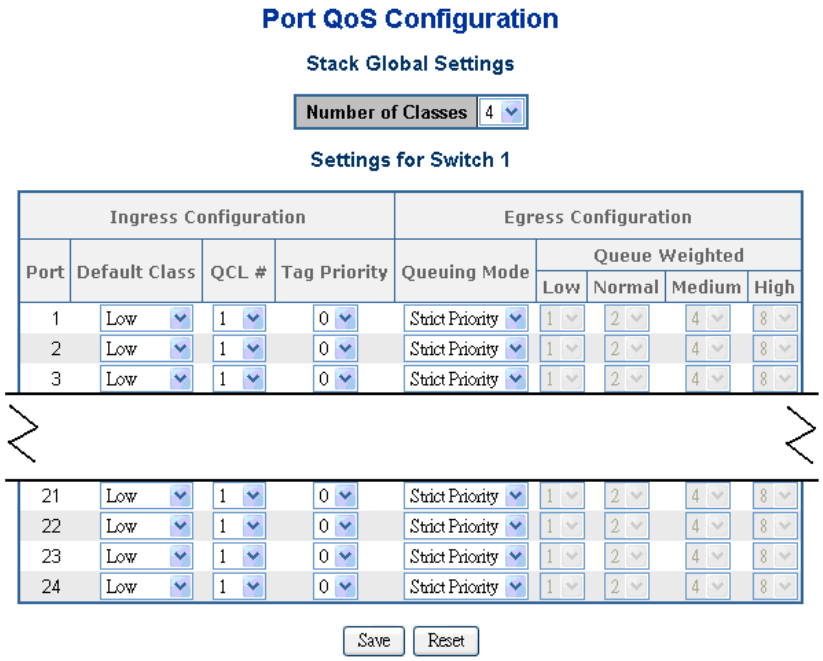

Port QoS Configuration
Stack Global Settings
Number of Classes 4
Settings for Switch 1
Ingress Configuration
Egress Configuration
Port
Default Class
QCL #
Tag Priority
Queuing Mode
Queue Weighted
Low
Normal
Medium
High
1 Low 1 0 Strict Priority 1 2 4 8
2 Low 1 0 Strict Priority 1 2 4 8
3 Low 1 0 Strict Priority 1 2 4 8
21 Low 1 0 Strict Priority 1 2 4 8
22 Low 1 0 Strict Priority 1 2 4 8
23 Low 1 0 Strict Priority 1 2 4 8
24 Low 1 0 Strict Priority 1 2 4 8
Save
Reset

Figure 4-8 *- Port QoS Configuration Global and Switch settings*

The page includes the following fields:

Object	Description
Number of Classes	Set the number of classes **1**, **2**, or **4**. The default value is **4**.
Port	The logical port for the settings contained in the same row.
Default Class	Configure the default QoS class for the port, that is, the QoS class for frames not matching any of the QCEs in the QCL.
QCL #	Select which QCL to use for the port.
Tag Priority	Select the default tag priority for this port when adding a Tag to the untagged frames.
Queuing Mode	Select a Queuing mode for this port.
Queue Weighted	Setting Queue may be weighted (**Low**:**Normal**:**Medium**:**High**) if the Queuing Mode is Weighted.

Console: QoS Configuration	
Description	Show QoS Configuration.
Syntax	`qos configuration` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports

Example:

Show QoS Configuration of port 1-4.

```
SWITCH/>qos configuration 1-4

QoS Configuration:
==================

Traffic Classes: 4

Storm Multicast: Disabled     1 pps
Storm Broadcast: Disabled     1 pps
Storm Unicast  : Disabled     1 pps

Port  Default  Tag Priority  QCL ID  Rate Limiter  Shaper     Mode      Weight
----  -------  ------------  ------  ------------  ---------  --------  ------
1     Low      0             1       Disabled      Disabled   Strict    1/2/4/8
2     Low      0             1       Disabled      Disabled   Strict    1/2/4/8
3     Low      0             1       Disabled      Disabled   Strict    1/2/4/8
4     Low      0             1       Disabled      Disabled   Strict    1/2/4/8
```

Console: QoS QCL Port	
Description	Set or show the port QCL ID.
Syntax	`qos qcl port` ***[<port_list>] [<qcl_id>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports ***<qcl_id>***: QCL ID
Default Setting	1

Example:

Set QCL ID5 for port10

```
SWITCH/>qos qcl port 10 5
```

Console: QoS Default	
Description	Set or show the default port priority.

Syntax	qos default ***[<port_list>] [<class>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports ***<class>***: Traffic class low/normal/medium/high or 1/2/3/4
Default Setting	Low

Example:

Set high priority for port5

```
SWITCH/>qos default 5 high
```

Console: QoS Tag Priority	
Description	Set or show the port VLAN tag priority.
Syntax	qos tagprio ***[<port_list>] [<tag_prio>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports ***<tag_prio>***: VLAN tag priority (0-7)
Default Setting	0

Example:

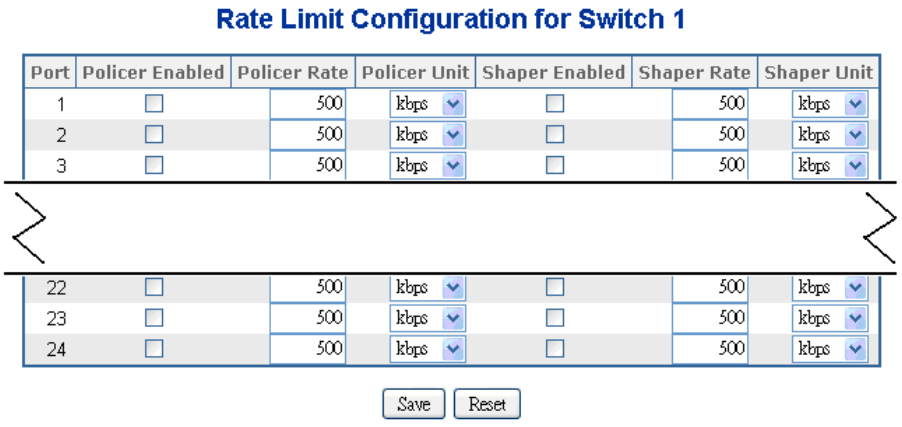
Set priority7 for port 3

```
SWITCH/>qos tagprio 3 7
```

Console: QoS Weight	
Description	Set or show the port egress scheduler weight.
Syntax	qos weight ***[<port_list>] [<class>] [<weight>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports ***<class>***: Traffic class low/normal/medium/high or 1/2/3/4 ***<weight>***: Traffic class weight 1/2/4/8

4.8.4 Bandwidth Control

Configure the switch port rate limit for Polices and Shapers. The settings relate to the currently selected stack unit.



The page includes the following fields:

Object	Description
Port	The logical port for the settings contained in the same row.
Policer Enabled	Enable or disable the port policer. The default value is "Disabled".
Policer Rate	Configure the rate for the port policer. *

Policer Unit	Configure the unit of measure for the port policer rate as kbps or Mbps. The default value is "kbps".
Shaper Enabled	Enable or disable the port shaper. The default value is "Disabled".
Shaper Rate	Configure the rate for the port shaper. *
Shaper Unit	Configure the unit of measure for the port shaper rate as kbps or Mbps. The default value is "kbps".

* For rates, the default value is "500". This value is restricted to 500-1000000 when the "Policer Unit" is "kbps", and it is restricted to 1-1000 when the "Policer Unit" is "Mbps"

Console: QoS Rate Limiter	
Description	Set or show the port rate limiter.
Syntax	`qos rate limiter` ***[<port_list>]*** **[enable|disable]** ***[<bit_rate>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable rate limiter **disable**: Disable rate limiter (default: Show rate limiter mode) ***<bit_rate>***: Rate in 1000 bits per second (500-1000000 kbps)
Default Setting	Disabled, 500kbps

Example:

Set 1000kbps rate limiter for port17~24

```
SWITCH/>qos rate limiter 17-24 enable 1000
```

Console: QoS Shaper	
Description	Set or show the port shaper.
Syntax	`qos shaper` ***[<port_list>]*** **[enable|disable]** ***[<bit_rate>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable shaper **disable**: Disable shaper (default: Show shaper mode) ***<bit_rate>***: Rate in 1000 bits per second (500-1000000 kbps)
Default Setting	Disabled, 500kbps

Example:

Set 1000kbps shaper for port 9~16

```
SWITCH/>qos shaper 9-16 enable 1000
```

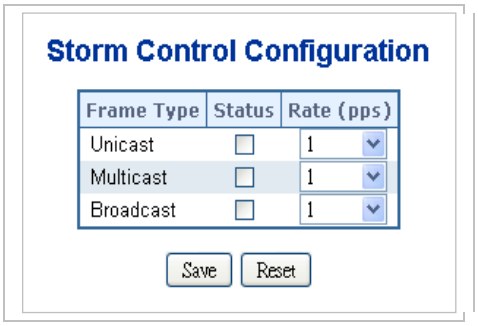
4.8.5 Storm Control Configuration

There three types of storm rate control:

- **Unicast** storm rate control
- **Multicast** storm rate control
- **Broadcast** storm rate control.

The rate is 2^n, where n is equal to or less than 15, or "No Limit". The unit of the rate can be either pps (packets per second) or

kpps (kilopackets per second). The configuration indicates the permitted packet rate for unicast, multicast, or broadcast traffic across the switch.



The page includes the following fields:

Object	Description
Frame Type	The settings in a particular row apply to the frame type listed here: • **unicast** • **multicast** • **broadcast**
Status	Enable or disable the storm control status for the given frame type.
Rate	The rate unit is packet per second (pps), configure the rate as **1**, **2**, **4**, **8**, **16**, **32**, **64**, **128**, **256**, **512**, **1K**, **2K**, **4K**, **8K**, **16K**, **32K**, **64K**, **128K**, **256K**, **512K**, or **1024K**. The 1 kpps is actually 1002.1 pps.

Console: QoS Storm Unicast	
Description	Set or show the unicast storm rate limiter.
Syntax	`qos storm unicast`
Parameters	**enable**: Enable unicast storm control **disable**: Disable unicast storm control **<packet_rate>**: Rate in pps (1, 2, 4, ..., 512, 1k, 2k, 4k, ..., 1024k)
Default Setting	Disabled, 1pps

Example:

Enable unicast storm rate limiter in 1kpps

```
SWITCH/>qos storm unicast enable 1k
```

Console: QoS Storm Multicast	
Description	Set or show the multicast storm rate limiter.
Syntax	`qos storm multicast` **`[enable|disable]`** ***`[<packet_rate>]`***
Parameters	**enable**: Enable multicast storm control **disable**: Disable multicast storm control ***<packet_rate>***: Rate in pps (1, 2, 4, ..., 512, 1k, 2k, 4k, ..., 1024k)
Default Setting	Disabled, 1pps

Example:

Enable multicast storm rate limiter in 1kpps

```
SWITCH/>qos storm multicast enable 1k
```

Console: QoS Storm Broadcast	
Description	Set or show the multicast storm rate limiter.

Syntax	`qos storm broadcast` **`[enable|disable]`** ***`[<packet_rate>]`***
Parameters	**enable**: Enable broadcast storm control **disable**: Disable broadcast storm control ***<packet_rate>***: Rate in pps (1, 2, 4, ..., 512, 1k, 2k, 4k, ..., 1024k)
Default Setting	Disabled, 1pps

Example:

Enable broadcast storm rate limiter in 1kpps

```
SWITCH/>qos storm broadcast enable 1k
```

4.8.6 QoS Statistics

The webpage provides statistics for the different queues for all switch ports belonging to the currently selected stack unit.

Queuing Counters for Switch 1

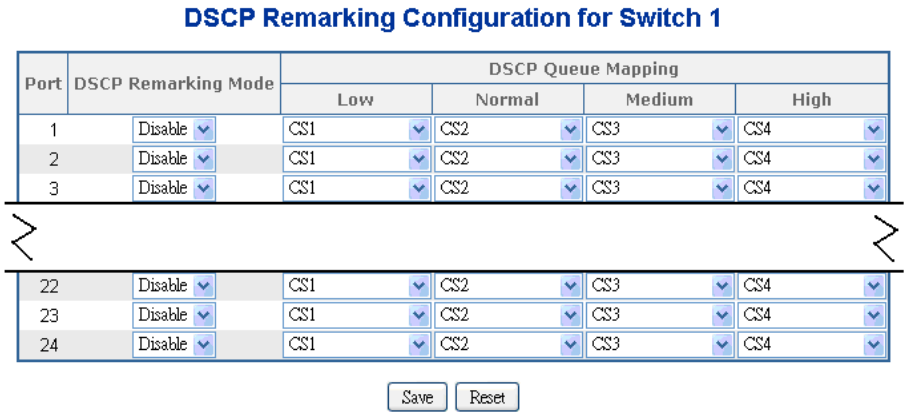
Port	Low Queue		Normal Queue		Medium Queue		High Queue	
	Receive	Transmit	Receive	Transmit	Receive	Transmit	Receive	Transmit
1	3365	526	0	0	0	0	0	8802
2	0	0	0	0	0	0	0	0
≥								≥
16	4902	3351	0	0	0	0	0	12561
17	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0

The page includes the following fields:

Object	Description
Port	The logical port for the settings contained in the same row.
Low Queue	There are 4 QoS queues per port with strict or weighted queuing scheduling. This is the lowest priority queue.
Normal Queue	This is the normal priority queue of the 4 QoS queues.
Medium Queue	This is the medium priority queue of the 4 QoS queues.
High Queue	This is the highest priority queue of the 4 QoS queues.
Receive/Transmit	The number of received and transmitted packets per port.

4.8.7 DSCP Remarking

Configure the DSCP remarking related settings for each port. The classification can be controlled by Port QoS configuration page. The DSCP value of incoming frames will be changed according to its mapping queue once this packet is transmitted by the egress port.



The page includes the following fields:

Object	Description
Port	The logical port for the settings contained in the same row.
DSCP Remarking Mode	If the QoS remarking mode is set to enabled, it should be with this DSCP remarking/correction function according to RFC2474 on this port.
DSCP Queue Mapping	Configure the mapping table between the queue and its DSCP value that is used for DSCP remarking if the DSCP value of incoming packets is not specified in RCF2474. • Best Effort = DSCP (0) • CS1 = DSCP (8) • CS2 = DSCP (16) • CS3 = DSCP (24) • CS4 = DSCP (32) • CS5 = DSCP (40) • CS6 = DSCP (48) • CS7 = DSCP (56) • Expedite Forward = DSCP (46)

Console: QoS DSCP Remarking	
Description	Set or show the status of QoS DSCP Remarking.
Syntax	`qos dscp remarking` ***[<port_list>]*** **`[enable|disable]`**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable QoS Remarking **disable**: Disable QoS Remarking
Default Setting	Disabled

Example:

Enable the status of QoS DSCP Remarking for port 1-4

```
SWITCH/>qos dscp remarking 1-4 enable
```

Console: QoS DSCP Queue Mapping	
Description	Set or show the default port priority.
Syntax	`qos dscp queue mapping` ***[<port_list>] [<class>] [<dscp>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports ***<class>***: Traffic class low/normal/medium/high or 1/2/3/4 ***<dscp>***: QoS DSCP Remarking Value 0/8/16/24/32/40/48/56/46

4.8.8 Voice VLAN Configuration

The Voice VLAN feature enables voice traffic forwarding on Voice VLAN, assigning voice traffic as a separate classification for scheduling purposes. Before connecting the IP voice device to the switch, ensure that the voice device has VLAN ID correctly configured through its own setup utility.

The Voice VLAN page includes the following fields:

Object	Description
Mode	Disable MSTP feature before enabling Voice VLAN to avoid ingress filter conflict. Possible Voice VLAN modes are: • **Enabled** • **Disabled**
VLAN ID	Indicates the Voice VLAN ID. The allowed range is ***1*** to ***4095***.
Age Time	Indicates the Voice VLAN secure learning age time when in security or auto detect mode. The allowed range is ***10*** to ***10000000*** seconds.
Traffic Class	Indicates the Voice VLAN traffic class. All traffic on Voice VLAN will apply this class.
Port Mode	Indicates the Voice VLAN port mode. Disable MSTP feature before enabling Voice VLAN to avoid ingress filter conflict. Possible modes are: • **Disabled**: Disjoin from Voice VLAN. • **Auto**: Enable auto detect mode. It detects whether there is VoIP phone attached on the specific port and configure the Voice VLAN members automatically. • **Forced**: Forced join to Voice VLAN.
Port Security	When the function is enabled, all non-telephone MAC address in Voice VLAN will be blocked for 10 seconds. Possible port modes are: • **Enabled** • **Disabled**

Console: VLAN Configuration	
Description	Show Voice VLAN configuration.
Syntax	`voice vlan configuration`

Example:

Show Voice VLAN configuration.

```
SWITCH/>voice vlan configuration

Voice VLAN Configuration:
=========================

Voice VLAN Mode               : Disabled
Voice VLAN VLAN ID            : 1000
Voice VLAN Age Time(seconds)  : 86400
Voice VLAN Traffic Class      : High

Voice VLAN OUI Table:
=====================

Telephony OUI Description
------------ -----------
00-30-4F      i3 International phones
00-03-6B      Cisco phones
00-0F-E2      H3C phones
00-60-B9      Philips and NEC AG phones
00-D0-1E      Pingtel phones
00-E0-75      Polycom phones
00-E0-BB      3Com phones
00-01-E3      Siemens AG phones
```

```
Voice VLAN Port Configuration:
==============================


Port  Mode      Security     Discovery Protocol
----  --------  --------     ------------------
1     Disabled  Disabled
2     Disabled  Disabled
3     Disabled  Disabled
4     Disabled  Disabled
5     Disabled  Disabled
6     Disabled  Disabled
7     Disabled  Disabled
8     Disabled  Disabled
9     Disabled  Disabled
10    Disabled  Disabled
11    Disabled  Disabled
12    Disabled  Disabled
13    Disabled  Disabled
14    Disabled  Disabled
15    Disabled  Disabled
16    Disabled  Disabled
17    Disabled  Disabled
18    Disabled  Disabled
19    Disabled  Disabled
20    Disabled  Disabled
21    Disabled  Disabled
22    Disabled  Disabled
23    Disabled  Disabled
24    Disabled  Disabled
```

Console: Voice VLAN Mode	
Description	Set or show the Voice VLAN configuration. MSTP feature must be disabled before enabling Voice VLAN.
Syntax	`voice vlan mode` **`[enable|disable]`**
Parameters	**enable**: Enable Voice VLAN mode. **disable**: Disable Voice VLAN mode (default: Show flow Voice VLAN mode)
Default Setting	Disabled

Example:

Enable the Voice VLAN mode.

```
SWITCH/>voice vlan mode enable
```

Console: Voice VLAN ID	
Description	Set or show Voice VLAN ID.
Syntax	`voice vlan id` ***[<vid>]***
Parameters	***<vid>***: VLAN ID (1-4095)
Default Setting	1000

Example:

Set ID 2 for Voice VLAN ID.

```
SWITCH/>voice vlan id 2
```

Console: Voice VLAN Agetime	
Description	Set or show Voice VLAN age time.
Syntax	`voice vlan agetime` ***[<age_time>]***
Parameters	***<age_time>***: MAC address age time (10-10000000) default: Show age time
Default Setting	86400sec

Example:

Set Voice VLAN age time in 100sec.

```
SWITCH/>voice valn agetime 100
```

Console: Voice VLAN Traffic Class	
Description	Set Voice VLAN traffic class
Syntax	`voice vlan traffic class` ***[<class>]***
Parameters	***<class>***: Traffic class low/normal/medium/high or 1/2/3/4
Default Setting	high

Example:

Set medium traffic class for voice VLAN

```
SWITCH/>voice vlan traffic class medium
```

Console: Voice VLAN Port Mode	
Description	Set or show the Voice VLAN port mode. When the port mode is not disabled, MSTP feature must be disabled before enabling Voice VLAN to avoid ingress filter conflict.
Syntax	`voice vlan port mode` ***[<port_list>]*** **[disable|auto|force]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **disable**: Disjoin from Voice VLAN. **auto**: Enable auto detect mode. It detects whether there is VoIP phone attached on the specific port and configure the Voice VLAN members automatically. **force**: Forced join to Voice VLAN. (default: Show Voice VLAN port mode)
Default Setting	disable

Example:

Set auto mode for port 1-4 of Voice VLAN port mode.

```
SWITCH/>voice vlan port mode 1-4 auto
```

Console: Voice VLAN Security	
Description	Set or show the Voice VLAN port security mode. When the function is enabled, all non-telephone MAC address in Voice VLAN will be blocked 10 seconds.
Syntax	`voice vlan security` ***[<port_list>]*** **[enable|disable]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable Voice VLAN security mode. **disable**: Disable Voice VLAN security mode (default: Show flow Voice VLAN security mode)
Default Setting	disable

Example:

Enable the Voice VLAN port security mode for port 1-4.

```
SWITCH/>voice vlan security 1-4 enable
```

4.8.9 Voice VLAN OUI Table

The maximum number of Voice VLAN OUI entries is 16. Modifying the OUI table will restart auto detect OUI process.

The page includes the following fields:

Object	Description
Delete	Check to delete the entry. It will be deleted during the next save.
Telephony OUI	A globally unique identifier assigned to a vendor by IEEE. It must be 6 characters long and the input format is "***xx-xx-xx***" (x is a hexadecimal digit).
Description	The description of OUI address. The allowed string length is 0 to 32.

Buttons

: Click to add a new access management entry.

Console: Voice VLAN OUI Add	
Description	Add Voice VLAN OUI entry. Modifying the OUI table will restart auto detect OUI process.
Syntax	`voice vlan oui add` ***<oui_addr> [<description>]***
Parameters	***<oui_addr>***: OUI address (xx-xx-xx) ***<description>***: Entry description. Use 'clear' or "" to clear the string No blank or space characters are permitted as part of a contact.(only in CLI)

Example:

Add Voice VLAN OUI entry.

```
SWITCH/>voice vlan oui add 00-11-22 test
```

Console: Voice VLAN OUI Delete	
Description	Delete Voice VLAN OUI entry. Modifying the OUI table will restart auto detect OUI process.
Syntax	`voice vlan oui delete` ***<oui_addr>***
Parameters	***<oui_addr>***: OUI address (xx-xx-xx)

Example:

Delete Voice VLAN OUI entry.

```
SWITCH/>voice vlan oui delete 00-11-22
```

Console: Voice VLAN OUI Clear	
Description	Clear Voice VLAN OUI entry. Modifying the OUI table will restart auto detect OUI process.
Syntax	`voice vlan oui clear`

Example:

Clear Voice VLAN OUI entry.

```
SWITCH/>voice vlan oui clear
```

Console: Voice VLAN OUI Lookup	
Description	Lookup Voice VLAN OUI entry.
Syntax	`voice vlan oui lookup` ***[<oui_addr>]***
Parameters	***<oui_addr>***: OUI address (xx-xx-xx), default: Show OUI address

Example:

Lookup Voice VLAN OUI entry.

```
SWITCH/>voice vlan oui lookup
```

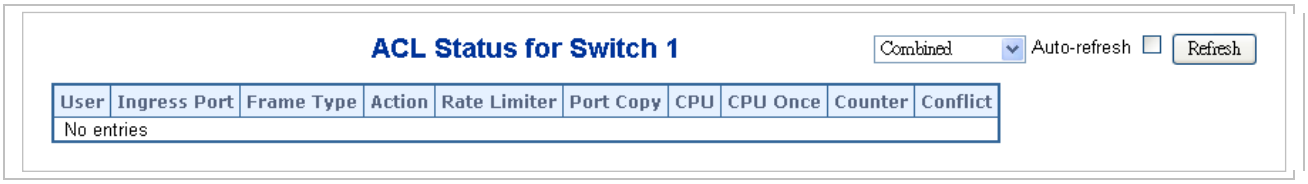
4.9 Access Control Lists

ACL is an acronym for Access Control List, a list table containing access control entries (ACEs) that specify individual users or groups permitted or denied to specific traffic objects, such as a process or a program. Each accessible traffic object contains an identifier to its ACL. The privileges determine whether there are specific traffic object access rights.

There are three ACE frame types (Ethernet Type, ARP, and IPv4) and two ACE actions (permit and deny). The ACE also contains many detailed, different parameter options that are available for individual application.

4.9.1 Access Control List Status

This page shows the ACL status by ACL user. Each row describes the ACE defined. It is a conflict if a specific ACE is not applied to the hardware due to hardware limitations.

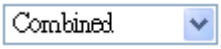


The page includes the following fields:

Object	Description
User	Indicates the ACL user.
Ingress Port	Indicates the ingress port of the ACE. Possible values are: • **Any**: The ACE will match any ingress port. • **Policy**: The ACE will match ingress ports with a specific policy. • **Port**: The ACE will match a specific ingress port.
Frame Type	Indicates the frame type of the ACE. Possible values are: • **Any**: The ACE will match any frame type. • **EType**: The ACE will match Ethernet Type frames. Note that an Ethernet Type based ACE will not get matched by IP and ARP frames. • **ARP**: The ACE will match ARP/RARP frames. • **IPv4**: The ACE will match all IPv4 frames. • **IPv4/ICMP**: The ACE will match IPv4 frames with ICMP protocol. • **IPv4/UDP**: The ACE will match IPv4 frames with UDP protocol. • **IPv4/TCP**: The ACE will match IPv4 frames with TCP protocol. • **IPv4/Other**: The ACE will match IPv4 frames, which are not ICMP/UDP/TCP.
Action	Indicates the forwarding action of the ACE. • **Permit**: Frames matching the ACE may be forwarded and learned. • **Deny**: Frames matching the ACE are dropped.
Rate Limiter	Indicates the rate limiter number of the ACE. The allowed range is ***1*** to ***15***. When the display reads **Disabled**, the rate limiter operation is disabled.
Port Copy	Indicates the port copy operation of the ACE. Frames matching the ACE are copied to the port number. The allowed values are **Disabled** or a specific port

	number.
CPU	Forward packet that matched the specific ACE to CPU.
CPU Once	Forward first packet that matched the specific ACE to CPU.
Counter	The counter indicates the number of times the ACE was hit by a frame.
Conflict	Indicates the hardware status of the specific ACE. The specific ACE is not applied to the hardware due to hardware limitations.

Buttons



: Select the ACL status from this drop down list.

Console: Security Network ACL Status	
Description	Show ACL status.
Syntax	`security network acl status [combined|static|dhcp|upnp|arp_inspection|ip_source_guard|conflicts]`
Parameters	**combined**: Shows the combined status **static**: Shows the static user configured status **dhcp**: Shows the status by DHCP **upnp**: Shows the status by UPnP **arp_inspection**: Shows the status by ARP Inspection **ip_source_guard**: Shows the status by IP Source Guard **conflicts**: Shows all conflict status (default: Shows the combined status)

Example:

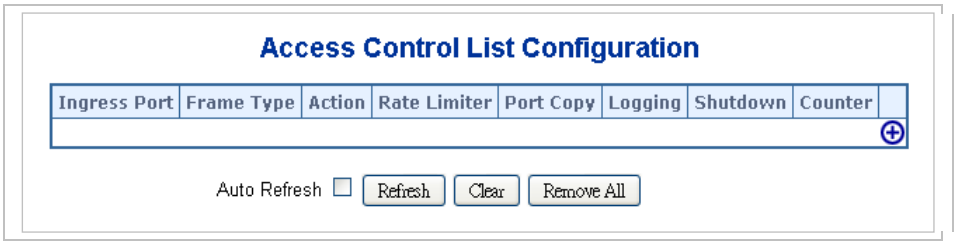
Show ACL status.

```
SWITCH/>security network acl status
```

4.9.2 Access Control List Configuration

This page shows the Access Control List (ACL), which is made up of the ACEs defined for this Managed Switch. Each row describes the ACE that is defined.

- The maximum number of ACEs is 128.
- Click on the lowest plus sign to add a new ACE to the list.



The page includes the following fields:

Object	Description
Ingress Port	Indicates the ingress port of the ACE. Possible values are: • **Any**: The ACE will match any ingress port. • **Policy**: The ACE will match ingress ports with a specific policy. • **Port**: The ACE will match a specific ingress port.

Frame Type	Indicates the frame type of the ACE. Possible values are: • **Any**: The ACE will match any frame type. • **EType**: The ACE will match Ethernet Type frames. • **ARP**: The ACE will match ARP/RARP frames. • **IPv4**: The ACE will match all IPv4 frames. • **IPv4/ICMP**: The ACE will match IPv4 frames with ICMP protocol. • **IPv4/UDP**: The ACE will match IPv4 frames with UDP protocol. • **IPv4/TCP**: The ACE will match IPv4 frames with TCP protocol. • **IPv4/Other**: The ACE will match IPv4 frames, which are not ICMP/UDP/TCP.
Action	Indicates the forwarding action of the ACE. • **Permit**: Frames matching the ACE may be forwarded and learned. • **Deny**: Frames matching the ACE are dropped.
Rate Limiter	Indicates the rate limiter number of the ACE. The allowed range is ***1*** to ***15***. When "**Disabled**" is displayed, the rate limiter operation is disabled.
Port Copy	Indicates the port copy operation of the ACE. Frames matching the ACE are copied to the port number. The allowed values are "**Disabled**" or a specific port number.
Logging	Indicates the logging operation of the ACE. Possible values are: • **Enabled**: Frames matching the ACE are stored in the System Log. • **Disabled**: Frames matching the ACE are not logged. • Please note that the System Log memory size and logging rate is limited.
Shutdown	Indicates the port shut down operation of the ACE. Possible values are: • **Enabled**: If a frame matches the ACE, the ingress port will be disabled. • **Disable**d: Port shut down is disabled for the ACE.
Counter	The counter indicates the number of times the ACE was hit by a frame.
Modification Buttons	You can modify each ACE (Access Control Entry) in the table using the following buttons: • : Inserts a new ACE before the current row. • : Edits the ACE row. • : Moves the ACE up the list. • : Moves the ACE down the list. • : Deletes the ACE. • : The lowest plus sign adds a new entry at the bottom of the ACE listings.

Buttons

Auto-refresh : Check this box to refresh the page automatically. Automatic refresh occurs at regular intervals.

Remove All : Click to remove all ACEs.

Console: Security Network ACL Configuration	
Description	Show ACL Configuration.
Syntax	`security network acl configuration` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports

Example:

Show ACL Configuration.

```
SWITCH/>security network acl configuration
ACL Configuration:
==================


Port  Policy  Action  Rate Limiter  Port Copy  Logging   Shutdown  Counter
----  ------  ------  ------------  ---------  --------  --------  -------
1     1       Permit  Disabled      Disabled   Disabled  Disabled  0
2     1       Permit  Disabled      Disabled   Disabled  Disabled  0
3     1       Permit  Disabled      Disabled   Disabled  Disabled  0
4     1       Permit  Disabled      Disabled   Disabled  Disabled  0
```

```
5     1       Permit  Disabled      Disabled   Disabled  Disabled  0
6     1       Permit  Disabled      Disabled   Disabled  Disabled  0
7     1       Permit  Disabled      Disabled   Disabled  Disabled  0
8     1       Permit  Disabled      Disabled   Disabled  Disabled  0
9     1       Permit  Disabled      Disabled   Disabled  Disabled  0
10    1       Permit  Disabled      Disabled   Disabled  Disabled  0
11    1       Permit  Disabled      Disabled   Disabled  Disabled  0
12    1       Permit  Disabled      Disabled   Disabled  Disabled  0
13    1       Permit  Disabled      Disabled   Disabled  Disabled  0
14    1       Permit  Disabled      Disabled   Disabled  Disabled  0
15    1       Permit  Disabled      Disabled   Disabled  Disabled  0
16    1       Permit  Disabled      Disabled   Disabled  Disabled  0
17    1       Permit  Disabled      Disabled   Disabled  Disabled  0
18    1       Permit  Disabled      Disabled   Disabled  Disabled  746
19    1       Permit  Disabled      Disabled   Disabled  Disabled  0
20    1       Permit  Disabled      Disabled   Disabled  Disabled  0
21    1       Permit  Disabled      Disabled   Disabled  Disabled  0
22    1       Permit  Disabled      Disabled   Disabled  Disabled  0
23    1       Permit  Disabled      Disabled   Disabled  Disabled  0
24    1       Permit  Disabled      Disabled   Disabled  Disabled  0

Rate Limiter  Rate
------------  ----
1             1
2             1
3             1
4             1
5             1
6             1
7             1
8             1
9             1
10            1
11            1
12            1
13            1
14            1
15            1

Number of ACEs: 0
```

Console: Security Network ACL Add	
Description	Add or modify Access Control Entry (ACE)
Syntax	`security network acl add` ***[<ace_id>] [<ace_id_next>]*** **[switch | (port** ***<port>*****) | (policy** ***<policy>*****)]** ***[<vid>] [<tag_prio>] [<dmac_type>]*** **[(etype** ***[<etype>] [<smac>] [<dmac>]*****) | (arp** ***[<sip>] [<dip>] [<smac>] [<arp_opcode>] [<arp_flags>]*****) | (ip** ***[<sip>] [<dip>] [<protocol>] [<ip_flags>]*****) | (icmp** ***[<sip>] [<dip>] [<icmp_type>] [<icmp_code>] [<ip_flags>]*****) | (udp** ***[<sip>] [<dip>] [<sport>] [<dport>] [<ip_flags>]*****) | (tcp** ***[<sip>] [<dip>] [<sport>] [<dport>] [<ip_flags>] [<tcp_flags>]*****)]** **[permit|deny]** ***[<rate_limiter>] [<port_copy>] [<logging>] [<shutdown>]***
Parameters	***<ace_id>***: ACE ID (1-128). ACE will be modified if already exists. default: Next available ID ***<ace_id_next>***: Next ACE ID (1-128), if specified, the ACE will be placed before this ACE in the list. default: Add ACE last **switch**: Switch ACE keyword. Rule will be applied to entire switch. **port**: Port ACE keyword. Rule will be applied to specified port. ***<port>***: Port number **policy**: Policy ACE keyword. Rule will be applied to all ports configured with specified policy. ***<policy>***: Policy number (1-8) ***<vid>***: VLAN ID (1-4095) or 'any' ***<tag_prio>***: VLAN tag priority (0-7) or 'any' ***<dmac_type>***: DMAC type: any|unicast|multicast|broadcast **etype**: Ethernet Type keyword ***<etype>***: Ethernet Type or 'any' ***<smac>***: Source MAC address (xx-xx-xx-xx-xx-xx) or 'any' ***<dmac>***: Destination MAC address (xx-xx-xx-xx-xx-xx) or 'any' **arp**: ARP keyword ***<sip>***: Source IP address (a.b.c.d/n) or 'any' ***<dip>***: Destination IP address (a.b.c.d/n) or 'any' ***<arp_opcode>***: ARP operation code: any|arp|rarp|other

	<arp_flags>: ARP flags: request|smac|tmac|len|ip|ether [0|1|any] **ip**: IP keyword ***<protocol>***: IP protocol number (0-255) or 'any' ***<ip_flags>***: IP flags: ttl|options|fragment [0|1|any] **icmp**: ICMP keyword ***<icmp_type>***: ICMP type number (0-255) or 'any' ***<icmp_code>***: ICMP code number (0-255) or 'any' **udp**: UDP keyword ***<sport>***: Source UDP/TCP port range (0-65535) or 'any' ***<dport>***: Destination UDP/TCP port range (0-65535) or 'any' **tcp**: TCP keyword ***<tcp_flags>***: TCP flags: fin|syn|rst|psh|ack|urg [0|1|any] **permit**: Permit forwarding (default) **deny**: Deny forwarding ***<rate_limiter>***: Rate limiter number (1-15) or 'disable' ***<port_copy>***: Port number for copy of frames or 'disable' ***<logging>***: System logging of frames: log|log_disable ***<shutdown>***: Shut down ingress port: shut|shut_disable

Console: Security Network ACL Delete	
Description	Delete ACE.
Syntax	`security network acl delete` ***<ace_id>***
Parameters	***<ace_id>***: ACE ID (1-128)

Example:

Delete ACE 1

```
SWITCH/>security network acl delete 1
```

Console: Security Network ACL Lookup	
Description	Show ACE, default: All ACEs.
Syntax	`security network acl lookup` ***[<ace_id>]***
Parameters	***<ace_id>***: ACE ID (1-128)

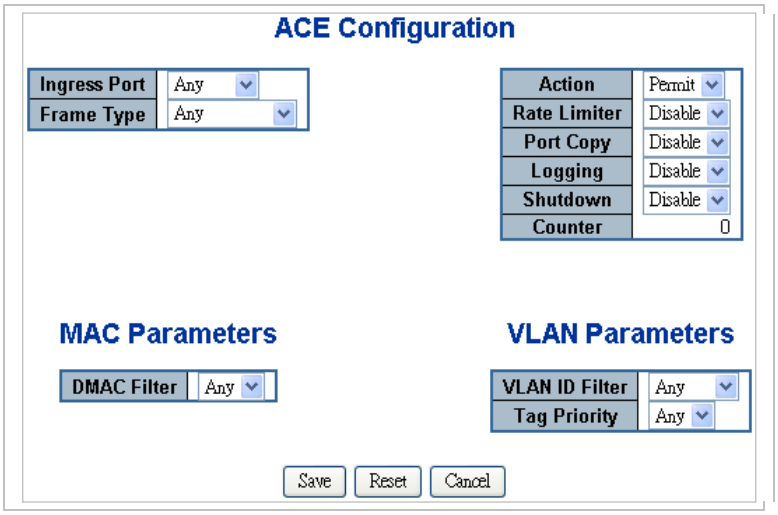
Example:

Lookup ACE 1

```
SWITCH/>security network acl lookup 1
```

4.9.3 ACE Configuration

Configure an ACE (Access Control Entry) on this page. An ACE consists of several parameters. These parameters vary according to the frame type that you select. First select the ingress port for the ACE, and then select the frame type. Different parameter options are displayed depending on the frame type that you selected.



The page includes the following fields:

Object	Description
Ingress Port	Select the ingress port for which this ACE applies. • **Any**: The ACE applies to any port. • **Port n**: The ACE applies to this port number, where n is the number of the switch port. • **Policy n**: The ACE applies to this policy number, where n can range from 1 through 8.
Frame Type	Select the frame type for this ACE. • **Any**: Any frame can match this ACE. • **Ethernet Type**: Only Ethernet Type frames can match this ACE. • **ARP**: Only ARP frames can match this ACE. • **IPv4**: Only IPv4 frames can match this ACE.
Action	Specify the action to take with a frame that hits this ACE. • **Permit**: The frame that hits this ACE is granted permission for the ACE operation. • **Deny**: The frame that hits this ACE is dropped.
Rate Limiter	Specify the rate limiter in number of base units. The allowed range is ***1*** to ***15***. **Disabled** indicates that the rate limiter operation is disabled.
Port Copy	Frames that hit the ACE are copied to the port number specified here. The allowed range is the same as the switch port number range. **Disabled** indicates that the port copy operation is disabled.
Logging	Specify the logging operation of the ACE. The allowed values are: • **Enabled**: Frames matching the ACE are stored in the System Log. • **Disabled**: Frames matching the ACE are not logged. Please note that the System Log memory size and logging rate is limited.
Shutdown	Specify the port shut down operation of the ACE. The allowed values are: • **Enabled**: If a frame matches the ACE, the ingress port will be disabled. • **Disabled**: Port shut down is disabled for the ACE.
Counter	The counter indicates the number of times the ACE was hit by a frame.

➢ **MAC Parameters**

Object	Description
SMAC Filter	(Only displayed when the frame type is Ethernet Type or ARP.) Specify the source MAC filter for this ACE. • **Any**: No SMAC filter is specified. (SMAC filter status is "don't-care".) • **Specific**: If you want to filter a specific source MAC address with this ACE, choose this value. A field for entering an SMAC value appears.
SMAC Value	When "**Specific**" is selected for the SMAC filter, you can enter a specific source MAC address. The legal format is ***"xx-xx-xx-xx-xx-xx***". A frame that hits this ACE matches this SMAC value.

DMAC Filter	Specify the destination MAC filter for this ACE. • **Any**: No DMAC filter is specified. (DMAC filter status is "don't-care".) • **MC**: Frame must be multicast. • **BC**: Frame must be broadcast. • **UC**: Frame must be unicast. • Specific: If you want to filter a specific destination MAC address with this ACE, choose this value. A field for entering a DMAC value appears.
DMAC Value	When "**Specific**" is selected for the DMAC filter, you can enter a specific destination MAC address. The legal format is "***xx-xx-xx-xx-xx-xx***". A frame that hits this ACE matches this DMAC value.

➢ **VLAN Parameters**

Object	Description
VLAN ID Filter	Specify the VLAN ID filter for this ACE. • **Any**: No VLAN ID filter is specified. (VLAN ID filter status is "don't-care".) • **Specific**: If you want to filter a specific VLAN ID with this ACE, choose this value. A field for entering a VLAN ID number appears.
VLAN ID	When "**Specific**" is selected for the VLAN ID filter, you can enter a specific VLAN ID number. The allowed range is 1 to 4095. A frame that hits this ACE matches this VLAN ID value.
Tag Priority	Specify the tag priority for this ACE. A frame that hits this ACE matches this tag priority. The allowed number range is ***0*** to ***7***. The value Any means that no tag priority is specified (tag priority is "don't-care".)

➢ **ARP Parameters**

The ARP parameters can be configured when Frame Type "ARP" is selected.

Object	Description
ARP/RARP	Specify the available ARP/RARP opcode (OP) flag for this ACE. • **Any**: No ARP/RARP OP flag is specified. (OP is "don't-care".) • **ARP**: Frame must have ARP/RARP opcode set to ARP. • **RARP**: Frame must have ARP/RARP opcode set to RARP. • **Other**: Frame has unknown ARP/RARP Opcode flag.
Request/Reply	Specify the available ARP/RARP opcode (OP) flag for this ACE. • **Any**: No ARP/RARP OP flag is specified. (OP is "don't-care".) • **Request**: Frame must have ARP Request or RARP Request OP flag set. • **Reply**: Frame must have ARP Reply or RARP Reply OP flag.
Sender IP Filter	Specify the sender IP filter for this ACE. • **Any**: No sender IP filter is specified. (Sender IP filter is "don't-care".) • **Host**: Sender IP filter is set to Host. Specify the sender IP address in the SIP Address field that appears. • **Network**: Sender IP filter is set to Network. Specify the sender IP address and sender IP mask in the SIP Address and SIP Mask fields that appear.
Sender IP Address	When "Host" or "Network" is selected for the sender IP filter, you can enter a specific sender IP address in dotted decimal notation.
Sender IP Mask	When "Network" is selected for the sender IP filter, you can enter a specific sender IP mask in dotted decimal notation.
Target IP Filter	Specify the target IP filter for this specific ACE. • **Any**: No target IP filter is specified. (Target IP filter is "don't-care".) • **Host**: Target IP filter is set to Host. Specify the target IP address in the Target IP Address field that appears. • **Network**: Target IP filter is set to Network. Specify the target IP address and target IP mask in the Target IP Address and Target IP Mask fields that appear.
Target IP Address	When "**Host**" or "**Network**" is selected for the target IP filter, you can enter a specific target IP address in dotted decimal notation.
Target IP Mask	When "**Network**" is selected for the target IP filter, you can enter a specific target IP mask in dotted decimal notation.

ARP SMAC Match	Specify whether frames can hit the action according to their sender hardware address field (SHA) settings. • **0**: ARP frames where SHA is not equal to the SMAC address. • **1**: ARP frames where SHA is equal to the SMAC address. • **Any**: Any value is allowed ("don't-care").
RARP SMAC Match	Specify whether frames can hit the action according to their target hardware address field (THA) settings. • **0**: RARP frames where THA is not equal to the SMAC address. • **1**: RARP frames where THA is equal to the SMAC address. • **Any**: Any value is allowed ("don't-care").
IP/Ethernet Length	Specify whether frames can hit the action according to their ARP/RARP hardware address length (HLN) and protocol address length (PLN) settings. • **0**: ARP/RARP frames where the HLN is equal to Ethernet (0x06) and the (PLN) is equal to IPv4 (0x04) must not match this entry. • **1**: ARP/RARP frames where the HLN is equal to Ethernet (0x06) and the (PLN) is equal to IPv4 (0x04) must match this entry. • **Any**: Any value is allowed ("don't-care").
IP	Specify whether frames can hit the action according to their ARP/RARP hardware address space (HRD) settings. • **0**: ARP/RARP frames where the HLD is equal to Ethernet (1) must not match this entry. • **1**: ARP/RARP frames where the HLD is equal to Ethernet (1) must match this entry. • **Any**: Any value is allowed ("don't-care").
Ethernet	Specify whether frames can hit the action according to their ARP/RARP protocol address space (PRO) settings. • **0**: ARP/RARP frames where the PRO is equal to IP (0x800) must not match this entry. • **1**: ARP/RARP frames where the PRO is equal to IP (0x800) must match this entry. • **Any**: Any value is allowed ("don't-care").

➢ **IP Parameters**

The IP parameters can be configured when Frame Type "IPv4" is selected.

Object	Description
IP Protocol Filter	Specify the IP protocol filter for this ACE. See the Glossary for more information. • **Any**: No IP protocol filter is specified ("don't-care"). • **Specific**: If you want to filter a specific IP protocol filter with this ACE, choose this value. A field for entering an IP protocol filter appears. • **ICMP**: Select ICMP to filter IPv4 ICMP protocol frames. Extra fields for defining ICMP parameters will appear. • **UDP**: Select UDP to filter IPv4 UDP protocol frames. Extra fields for defining UDP parameters will appear. • **TCP**: Select TCP to filter IPv4 TCP protocol frames. Extra fields for defining TCP parameters will appear.
IP Protocol Value	When "Specific" is selected for the IP protocol value, you can enter a specific value. The allowed range is ***0*** to ***255***. A frame that hits this ACE matches this IP protocol value.
IP TTL	Specify the Time-to-Live settings for this ACE. • **zero**: IPv4 frames with a Time-to-Live field greater than zero must not be able to match this entry. • **non-zero**: IPv4 frames with a Time-to-Live field greater than zero must be able to match this entry. • **Any**: Any value is allowed ("don't-care").
IP Fragment	Specify the fragment offset settings for this ACE. This involves the settings for the More Fragments (MF) bit and the Fragment Offset (FRAG OFFSET) field for an IPv4 frame. • **No**: IPv4 frames where the MF bit is set or the FRAG OFFSET field is greater than zero must not be able to match this entry. • **Yes**: IPv4 frames where the MF bit is set or the FRAG OFFSET field is greater than zero must be able to match this entry. • **Any**: Any value is allowed ("don't-care").
IP Option	Specify the options flag setting for this ACE. • **No**: IPv4 frames where the options flag is set must not be able to match this entry. • **Yes**: IPv4 frames where the options flag is set must be able to match this entry.

	• **Any**: Any value is allowed ("don't-care").
SIP Filter	Specify the source IP filter for this ACE. • **Any**: No source IP filter is specified. (Source IP filter is "don't-care".) • **Host**: Source IP filter is set to Host. Specify the source IP address in the SIP Address field that appears. • **Network**: Source IP filter is set to Network. Specify the source IP address and source IP mask in the SIP Address and SIP Mask fields that appear.
SIP Address	When "**Host**" or "**Network**" is selected for the source IP filter, you can enter a specific SIP address in dotted decimal notation.
SIP Mask	When "**Network**" is selected for the source IP filter, you can enter a specific SIP mask in dotted decimal notation.
DIP Filter	Specify the destination IP filter for this ACE. • **Any**: No destination IP filter is specified. (Destination IP filter is "don't-care".) • **Host**: Destination IP filter is set to Host. Specify the destination IP address in the DIP Address field that appears. • **Network**: Destination IP filter is set to Network. Specify the destination IP address and destination IP mask in the DIP Address and DIP Mask fields that appear.
DIP Address	When "**Host**" or "**Network**" is selected for the destination IP filter, you can enter a specific DIP address in dotted decimal notation.
DIP Mask	When "**Network**" is selected for the destination IP filter, you can enter a specific DIP mask in dotted decimal notation.

➢ **ICMP Parameters**

Object	Description
ICMP Type Filter	Specify the ICMP filter for this ACE. • **Any**: No ICMP filter is specified (ICMP filter status is "don't-care"). • **Specific**: If you want to filter a specific ICMP filter with this ACE, you can enter a specific ICMP value. A field for entering an ICMP value appears.
ICMP Type Value	When "**Specific**" is selected for the ICMP filter, you can enter a specific ICMP value. The allowed range is 0 to 255. A frame that hits this ACE matches this ICMP value.
ICMP Code Filter	Specify the ICMP code filter for this ACE. • **Any**: No ICMP code filter is specified (ICMP code filter status is "don't-care"). • **Specific**: If you want to filter a specific ICMP code filter with this ACE, you can enter a specific ICMP code value. A field for entering an ICMP code value appears.
ICMP Code Value	When "**Specific**" is selected for the ICMP code filter, you can enter a specific ICMP code value. The allowed range is ***0*** to ***255***. A frame that hits this ACE matches this ICMP code value.

➢ **TCP/UDP Parameters**

Object	Description
TCP/UDP Source Filter*	Specify the TCP/UDP source filter for this ACE. See note below for details • **Any**: No TCP/UDP source filter is specified. • **Specific**: Enter a specific TCP/UDP source value. • **Range**: Enter a specific TCP/UDP source range value
TCP/UDP Source No.**	See note below for details
TCP/UDP Source Range***	See note below for details
TCP/UDP Destination Filter*	Specify the TCP/UDP destination filter for this ACE. See note below for details • **Any**: No TCP/UDP destination filter is specified • **Specific**: Enter a specific TCP/UDP destination value • **Range**: Enter a specific TCP/UDP destination range value.
TCP/UDP Destination Number **	See note below for details
TCP/UDP Destination Range ***	See note below for details

TCP FIN†	Specify the TCP "No more data from sender" (FIN) value for this ACE. See notes below for details
TCP SYN†	Specify the TCP "Synchronize sequence numbers" (SYN) value for this ACE. See notes below for details
TCP PSH†	Specify the TCP "Push Function" (PSH) value for this ACE. See notes below for details
TCP ACK†	Specify the TCP "Acknowledgment field significant" (ACK) value for this ACE. See notes below for details
TCP URG†	Specify the TCP "Urgent Pointer field significant" (URG) value for this ACE. See notes below for details

	* For source/destination filters: • **Any:** TCP/UDP filter status is "don't-care". • **Specific**: Enter a specific TCP/UDP value. A field for entering a TCP/UDP vlue appears for this purpose • **Range:** Enter a specific TCP/UDP range. A field for entering a TCP/UDP value appears. ** Specified source/destination filter: When "Specific" is selected for a TCP/UDP filter, you can enter a specific TCP/UDP value. The allowed range is 0 to 65535. A frame that hits this ACE matches this TCP/UDP source or destination value. ***When "Range" is selected for a TCP/UDP filter, you can enter a specific TCP/UDP range value. The allowed range is 0 to 65535. A frame that hits this ACE matches this TCP/UDP source or destination value. † Specify the TCP value for this ACE. • **0**: TCP frames where this field is set must not be able to match this entry. • **1**: TCP frames where this field is set must be able to match this entry. • **Any**: Any value is allowed ("don't-care").

➢ **Ethernet Type Parameters**

The Ethernet Type parameters can be configured when Frame Type "Ethernet Type" is selected.

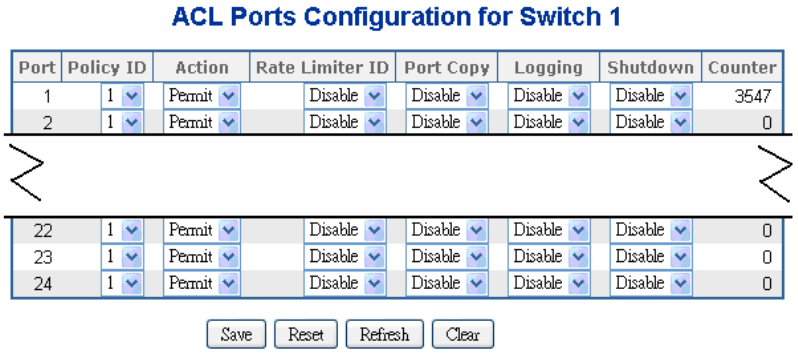
Object	Description
EtherType Filter	Specify the Ethernet type filter for this ACE. • **Any**: No EtherType filter is specified (EtherType filter status is "don't-care"). • **Specific**: If you want to filter a specific EtherType filter with this ACE, you can enter a specific EtherType value. A field for entering a EtherType value appears.
Ethernet Type Value	When "**Specifi**c" is selected for the EtherType filter, you can enter a specific EtherType value. The allowed range is ***0x600 to 0xFFFF***. A frame that hits this ACE matches this EtherType value.

Buttons

Cancel: Return to the previous page.

4.9.4 ACL Ports Configuration

Configure the ACL parameters (ACE) of each switch port. These parameters will affect frames received on a port unless the frame matches a specific ACE. The settings relate to the currently selected stack unit, as reflected by the page header.



The page includes the following fields:

Object	Description
Port	The logical port for the settings contained in the same row.
Policy ID	Select the policy to apply to this port. The allowed values are ***1*** through ***8***. The default value is **1**.
Action	Select whether forwarding is permitted ("Permit") or denied ("Deny"). The default value is "**Permit**".
Rate Limiter ID	Select which rate limiter to apply to this port. The allowed values are Disabled or the values ***1*** through ***15***. The default value is "Disabled".
Port Copy	Select which port frames are copied to. The allowed values are Disabled or a specific port number. The default value is "**Disabled**".
Logging	Specify the logging operation of this port. The allowed values are: • **Enabled**: Frames received on the port are stored in the System Log. • **Disabled**: Frames received on the port are not logged. The default value is "**Disabled**". Please note that the System Log memory size and logging rate is limited.
Shutdown	Specify the port shut down operation of this port. The allowed values are: • **Enabled**: If a frame is received on the port, the port will be disabled. • **Disabled**: Port shut down is disabled. The default value is "**Disabled**".
Counter	Counts the number of frames that match this ACE.

Console: Security Network ACL Action	
Description	Set or show the ACL port default action.
Syntax	`security network acl action` ***[<port_list>]*** **[permit|deny]** ***[<rate_limiter>] [<port_copy>] [<logging>] [<shutdown>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports **permit**: Permit forwarding (default) **deny**: Deny forwarding ***<rate_limiter>***: Rate limiter number (1-15) or 'disable' ***<port_copy>***: Port number for copy of frames or 'disable' ***<logging>***: System logging of frames: log|log_disable ***<shutdown>***: Shut down ingress port: shut|shut_disable
Default Setting	300

Example:

Show ACL action in port 1

```
SWITCH/>security network acl action 1

Port  Action  Rate Limiter  Port Copy  Logging   Shutdown  Counter
----  ------  ------------  ---------  --------  --------  -------
1     Permit  Disabled      Disabled   Disabled  Disabled  0
```

Console: Security Network ACL Policy	
Description	Set or show the ACL port policy.
Syntax	`security network acl policy` ***[<port_list>] [<policy>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports ***<policy>***: Policy number (1-8)
Default Setting	1

Example:

Set ACL policy 2 for port 1

```
SWITCH/>security network acl policy 1 2
```

Console: Security Network ACL Clear	
Description	Clear all ACL counters.
Syntax	`security network acl clear`

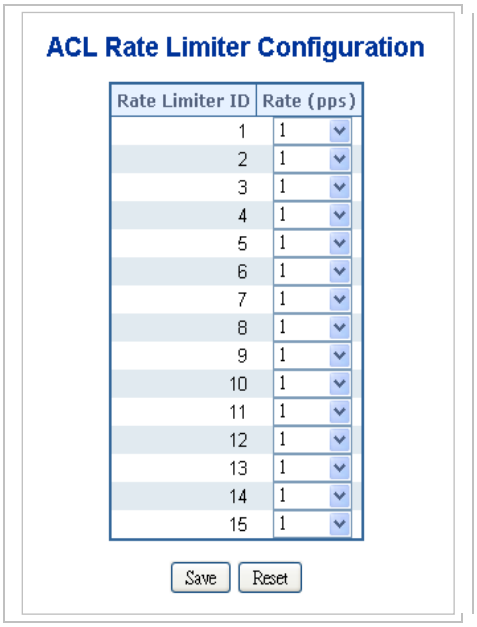
Example:

Clear all ACL counters.

```
SWITCH/>security network acl clear
```

4.9.5 ACL Rate Limiter Configuration

Configure the rate limiter for the ACL of the switch.



The page includes the following fields:

Object	Description
Rate Limiter ID	The rate limiter ID for the settings contained in the same row.
Rate	The rate unit is packet per second (pps), configure the rate as ***1***, ***2***, ***4***, ***8***, ***16***, ***32***, ***64***, ***128***, ***256***, ***512***, ***1K***, ***2K***, ***4K***, ***8K***, ***16K***, ***32K***, ***64K***, ***128K***, ***256K***, ***512K***, or ***1024K***.

Console: Security Network ACL Rate	
Description	Set or show the ACL rate limiter.
Syntax	`security network acl rate` ***[<rate_limiter_list>] [<packet_rate>]***
Parameters	***<rate_limiter_list>***: Rate limiter list (1-15), default: All rate limiters ***<packet_rate>***: Rate in pps (1, 2, 4, ..., 512, 1k, 2k, 4k, ..., 1024k)
Default Setting	1

Example:

Set rate limit value in 1024k for port 1

```
SWITCH/>security network acl rate 1 1024k
```

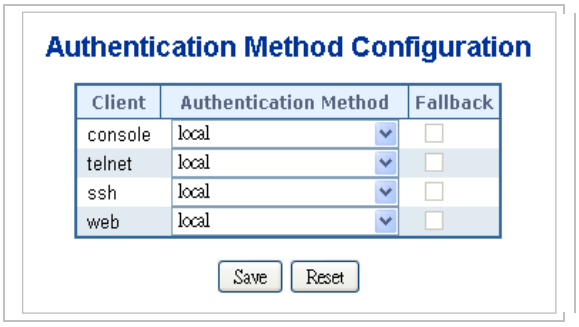
4.10 Authentication

This section is to control the access of the Managed Switch, includes the user access and management control. The Authentication section contains links to the following main topics:

- IEEE 802.1X Port-Based Network Access Control
- MAC-Based Authentication
- User Authentication

4.10.1 Authentication Configuration

This page allows you to configure how an administrator is authenticated when he logs into the switch via TELNET, SSH or the web pages.



The page includes the following fields:

Object	Description
Client	The management client for which the configuration below applies.
Authentication Method	Authentication Method can be set to one of the following values: • **None**: authentication is disabled and login is not possible. • **local**: use the local user database on the switch stack for authentication. • **radius**: use a remote RADIUS server for authentication. • **tacacs+**: use a remote TACACS+ server for authentication.
Fallback	Enable fallback to local authentication by checking this box. If none of the configured authentication servers are alive, the local user database is used for authentication. This is only possible if the Authentication Method is set to something else than 'none or 'local'.

Console: Security Switch Auth Configuration	
Description	Show Authentication configuration.
Syntax	`security switch auth configuration`
Default Setting	Authentication Method: local Fallback: disable

Example:

Show authentication configuration.

```
SWITCH/>security switch auth configuration

Auth Configuration:
===================

Client   Authentication Method   Local Authentication Fallback
-------  ----------------------  ------------------------------
console  local                   Disabled
telnet   local                   Disabled
ssh      local                   Disabled
web      local                   Disabled
```

Console: Security Switch Auth Method	
Description	Set or show Authentication method.
Syntax	`security switch auth method` **`[console|telnet|ssh|web] [none|local|radius|tacacs+] [enable|disable]`**
Parameters	**console**: Settings for console **telnet**: Settings for telnet **ssh**: Settings for ssh **web**: Settings for web **none**: Authentication disabled **local**: Use local authentication **radius**: Use remote RADIUS authentication **tacacs+**: Use remote TACACS+ authentication (default: Show client authentication method) **enable**: Enable local authentication if remote authentication fails **disable**: Disable local authentication if remote authentication fails (default: Show backup client authentication configuration)
Default Setting	Authentication Method: local Fallback: disable

Example:

Use RADIUS authentication method for telnet.

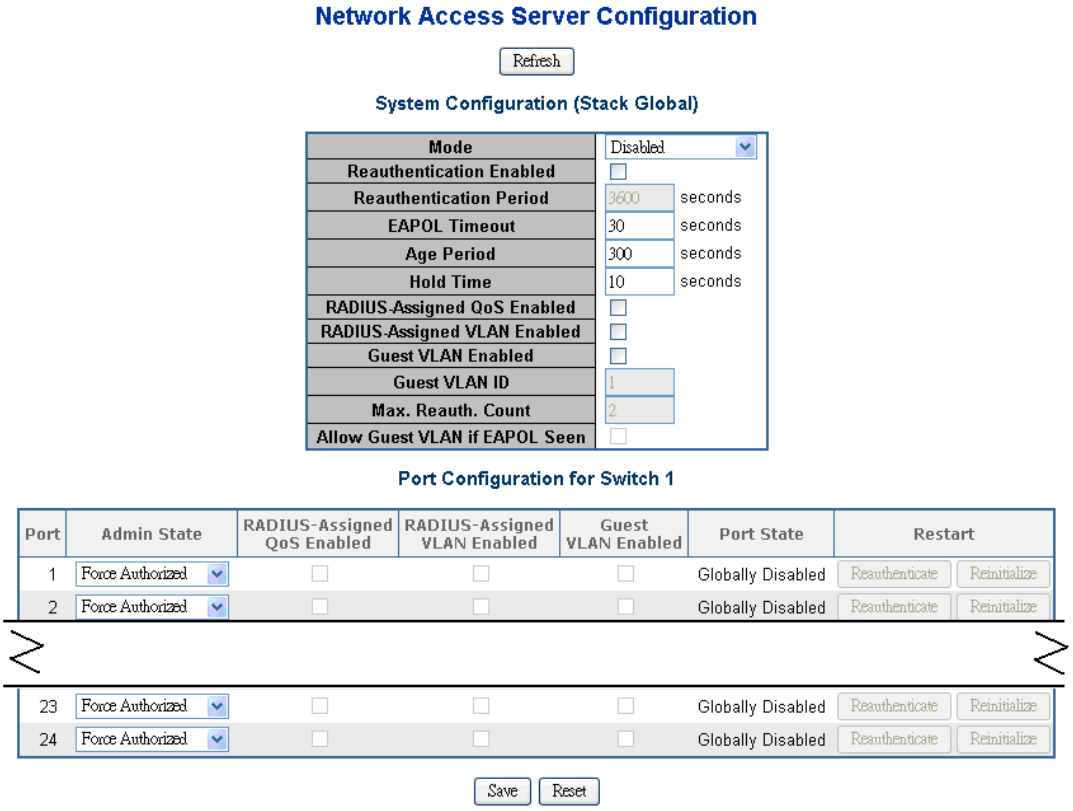
```
SWITCH/>security switch auth method telnet radius enable
```

4.10.2 Network Access Server Configuration

This page allows you to configure the IEEE 802.1X and MAC-based authentication system and port settings.

The IEEE 802.1X standard defines a port-based access control procedure that prevents unauthorized access to a network by requiring users to first submit credentials for authentication.

MAC-based authentication allows for authentication of more than one user on the same port, and doesn't require the user to have special 802.1X supplicant software installed on his system. The switch uses the user's MAC address to authenticate against the backend server.



The page includes the following fields:

- **System Configuration**

Object	Description
Mode	Indicates if NAS is globally enabled or disabled on the switch. If globally disabled, all ports are allowed forwarding of frames.
Reauthentication Enabled	If checked, successfully authenticated supplicants/clients are re-authenticated after the interval specified by the Re-authentication Period.
Reauthentication Period	Determines the period, in seconds, after which a connected client must be reauthenticated. This is only active if the Reauthentication Enabled checkbox is checked. Valid values are in the range ***1*** to ***3600*** seconds.
EAPOL Timeout	Determines the time between retransmission of Request Identity EAPOL frames. Valid values are in the range ***1*** to ***255*** seconds. This has no effect for MAC-based ports.
Age Period	This setting applies to the following modes, i.e. modes using the Port Security functionality to secure MAC addresses: • **Single 802.1X** • **Multi 802.1X** • **MAC-Based Auth.**
Hold Time	This setting applies to the following modes, i.e. modes using the Port Security functionality to secure MAC addresses: • **Single 802.1X** • **Multi 802.1X** • **MAC-Based Auth.** The Hold Time can be set to a number between ***10*** and ***1000000*** seconds.
RADIUS-Assigned QoS Enabled	When checked, the individual ports' ditto setting determines whether RADIUS-assigned QoS Class is enabled for that port. When unchecked, RADIUS-server assigned QoS Class is disabled for all ports.
RADIUS-Assigned VLAN Enabled	When checked, the individual ports' ditto setting determines whether RADIUS-assigned VLAN is enabled for that port. When unchecked, RADIUS-server assigned VLAN is disabled for all ports.

Guest VLAN Enabled	When checked, the individual ports' ditto setting determines whether the port can be moved into Guest VLAN. When unchecked, the ability to move to the Guest VLAN is disabled for all ports.
Guest VLAN ID	This is the value that a port's Port VLAN ID is set to if a port is moved into the Guest VLAN. It is only changeable if the Guest VLAN option is globally enabled. Valid values are in the range [***1***; ***4095***].
Max. Reauth. Count	The number of times that the switch transmits an EAPOL Request Identity frame without response before considering entering the Guest VLAN is adjusted with this setting. The value can only be changed if the Guest VLAN option is globally enabled. Valid values are in the range [***1***; ***255***].
Allow Guest VLAN if EAPOL Seen	If disabled (unchecked; default), the switch will only enter the Guest VLAN if an EAPOL frame has not been received on the port for the life-time of the port. If enabled (checked), the switch will consider entering the Guest VLAN even if an EAPOL frame has been received on the port for the life-time of the port. The value can only be changed if the Guest VLAN option is globally enabled.

- **Port Configuration**

The table has one row for each port on the selected switch in the stack and a number of columns, which are:

Object	Description
Port	The port number for which the configuration below applies.
Admin State	If NAS is globally enabled, this selection controls the port's authentication mode. The following modes are available: • **Force Authorized**: In this mode, the switch will send one EAPOL Success frame when the port link comes up, and any client on the port will be allowed network access without authentication. • **Force Unauthorized**: In this mode, the switch will send one EAPOL Failure frame when the port link comes up, and any client on the port will be disallowed network access. • **Port-based 802.1X**: The authenticator acts as the man-in-the-middle, forwarding requests and responses between the supplicant and the authentication server. The switch simply encapsulates the EAP part of the frame into the relevant type (EAPOL or RADIUS) and forwards it. When authentication is complete, the RADIUS server sends a special packet containing a success or failure indication. Besides forwarding this decision to the supplicant, the switch uses it to open up or block traffic on the switch port connected to the supplicant. Note that server timeout should be smaller than the supplicant's EAPOL Start frame retransmission rate. • **Single 802.1X**: In port-based 802.1X authentication, once a supplicant is successfully authenticated on a port, the whole port is opened for network traffic. This allows other clients connected to the port (for instance through a hub) to piggy-back on the successfully authenticated client and get network access. In this mode, the Port Security module is used to secure a supplicant's MAC address once successfully authenticated. • **Multi 802.1X**: In port-based 802.1X authentication, once a supplicant is successfully authenticated on a port, the whole port is opened for network traffic. This allows other clients connected to the port (for instance through a hub) to piggy-back on the successfully authenticated client and get network. The maximum number of supplicants that can be attached to a port can be limited using the Port Security Limit Control functionality. • **MAC-based Auth.**: In MAC-based authentication, the initial frame (any kind of frame) sent by a client is snooped by the switch, which in turn uses the client's MAC address as both username and password in the subsequent EAP exchange with the RADIUS server.
RADIUS-Assigned QoS Enabled	When RADIUS-Assigned QoS is both globally enabled and enabled (checked) for a given port, the switch reacts to QoS Class information carried in the RADIUS Access-Accept packet transmitted by the RADIUS server when a supplicant is successfully authenticatedThis option is only available for single-client modes, i.e. • **Port-based 802.1X** • **Single 802.1X**

RADIUS-Assigned VLAN Enabled	When RADIUS-Assigned VLAN is both globally enabled and enabled (checked) for a given port, the switch reacts to VLAN ID information carried in the RADIUS Access-Accept packet transmitted by the RADIUS server when a supplicant is successfully authenticated. This option is only available for single-client modes, i.e. • **Port-based 802.1X** • **Single 802.1X** The Tunnel-Medium-Type, Tunnel-Type, and Tunnel-Private-Group-ID attributes must all be present at least once in the Access-Accept packet. Value of Tunnel-Private-Group-ID must be a string of ASCII chars in the range '0' - '9', which is interpreted as a decimal string representing the VLAN ID. Leading '0's are discarded. The final value must be in the range [1; 4095].
Guest VLAN Enabled	When Guest VLAN is both globally enabled and enabled (checked) for a given port, the switch considers moving the port into the Guest VLAN according to the rules outlined below. This option is only available for EAPOL-based modes, i.e.: • **Port-based 802.1X** • **Single 802.1X** • **Multi 802.1X** When a Guest VLAN enabled port's link comes up, the switch starts transmitting EAPOL Request Identity frames. If the number of transmissions of such frames exceeds Max. Reauth. Count and no EAPOL frames have been received in the meanwhile, the switch considers entering the Guest VLAN. The interval between transmission of EAPOL Request Identity frames is configured with EAPOL Timeout. If Allow Guest VLAN if EAPOL Seen is enabled, the port will now be placed in the Guest VLAN. If disabled, the switch will first check its history to see if an EAPOL frame has previously been received on the port (this history is cleared if the port link goes down or the port's Admin State is changed), and if not, the port will be placed in the Guest VLAN. Otherwise it will not move to the Guest VLAN, but continue transmitting EAPOL Request Identity frames at the rate given by EAPOL Timeout. Once in the Guest VLAN, the port is considered authenticated, and all attached clients on the port are allowed access on this VLAN. The switch will not transmit an EAPOL Success frame when entering the Guest VLAN. While in the Guest VLAN, the switch monitors the link for EAPOL frames, and if one such frame is received, the switch immediately takes the port out of the Guest VLAN and starts authenticating the supplicant according to the port mode. If an EAPOL frame is received, the port will never be able to go back into the Guest VLAN if the "Allow Guest VLAN if EAPOL Seen" is disabled.
Port State	The current state of the port. It can undertake one of the following values: Globally Disabled: NAS is globally disabled. • **Link Down**: NAS is globally enabled, but there is no link on the port. • **Authorized**: The port is in Force Authorized or a single-supplicant mode and the supplicant is authorized. • **Unauthorized**: The port is in Force Unauthorized or a single-supplicant mode and the supplicant is not successfully authorized by the RADIUS server. • **X Auth/Y Unauth**: The port is in a multi-supplicant mode. Currently X clients are authorized and Y are unauthorized.
Restart	The buttons are only enabled when authentication is globally enabled and the port's Admin State is in an EAPOL-based or MAC-based mode. Clicking these buttons will not cause settings changed on the page to take effect. • **Reauthenticate**: Schedules a reauthentication to whenever the quiet-period of the port runs out (EAPOL-based authentication). For MAC-based authentication, reauthentication will be attempted immediately. The button only has effect for successfully authenticated clients on the port and will not cause the clients to get temporarily unauthorized. • **Reinitialize**: Forces a reinitialization of the clients on the port and thereby a reauthentication immediately. The clients will transfer to the unauthorized state while the reauthentication is in progress.

Console: Security Network NAS Mode	
Description	Set or show the global NAS enabledness.
Syntax	`security network nas mode` **`[enable|disable]`**
Parameters	**enable**: Globally enable 802.1X **disable**: Globally disable 802.1X

	(default: Show current 802.1X global enabledness)
Default Setting	disable

Example:

Enable IEEE802.1X function

```
SWITCH/>security network nas mode enable
```

Console: Security Network NAS Configuration	
Description	Show 802.1X configuration.
Syntax	`security network nas configuration` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports

Example:

Show 802.1X configuration of port 1

```
SWITCH/>security network nas configuration 1

802.1X Configuration:
=====================

Mode             : Disabled
Reauth.          : Disabled
Reauth. Period   : 3600
EAPOL Timeout    : 30
Age Period       : 300
Hold Time        : 10
RADIUS QoS       : Disabled
RADIUS VLAN      : Disabled
Guest VLAN       : Disabled
Guest VLAN ID    : 1
Max. Reauth Count: 2
Allow Guest VLAN if EAPOL Frame Seen: Disabled

Port  Admin State         Port State             Last Source        Last ID
----  ------------------  ---------------------  --------------    -----------
1     Force Authorized    Globally Disabled       -                 -
```

Console: Security Network NAS Reauthentication	
Description	Set or show Reauthentication enabledness.
Syntax	`security network nas reauthentication` **[enable|disable]**
Parameters	**enable** : Enable reauthentication **disable**: Disable reauthentication (default: Show current reauthentication mode)
Default Setting	disable

Example:

Enable reauthentication function.

```
SWITCH/>security network nas reauthentication enable
```

Console: Security Network NAS ReauthPeriod	
Description	Set or show the period between reauthentications.
Syntax	`security network nas reauthperiod` ***[<reauth_period>]***
Parameters	***<reauth_period>***: Period between reauthentications (1-3600 seconds) (default: Show current reauthentication period)
Default Setting	3600

Example:

Set reauthentication period in 3000sec.

```
SWITCH/>security network nas reauthperiod 3000
```

Console: Security Network NAS EapolTimeout	
Description	Set or show the time between EAPOL retransmissions.
Syntax	`security network nas eapoltimeout` ***[<eapol_timeout>]***
Parameters	***<eapol_timeout>***: Time between EAPOL retransmissions (1-65535 seconds) (default: Show current EAPOL retransmission timeout)
Default Setting	30

Example:

Set the time between EAPOL retransmissions for 100sec.

```
SWITCH/>security network nas eapoltimeout 100
```

Console: Security Network NAS Agetime	
Description	Time in seconds between check for activity on successfully authenticated MAC addresses.
Syntax	`security network nas agetime` ***[<age_time>]***
Parameters	***<age_time>***: Time between checks for activity on a successfully authenticated MAC address (default: Show current age time)
Default Setting	300

Example:

Set NAS age time in 1000sec

```
SWITCH/>security network nas agetime 1000
```

Console: Security Network NAS Holdtime	
Description	Time in seconds before a MAC-address that failed authentication gets a new authentication chance.
Syntax	`security network nas holdtime` ***[<hold_time>]***
Parameters	***<hold_time>***: Hold time before MAC addresses that failed authentication expire (default: Show current hold time)
Default Setting	10

Example:

Set NAS hold time in 100sec

```
SWITCH/>security network nas holdtime 100
```

Console: Security Network NAS State	
Description	Set or show the port security state.
Syntax	`security network nas state` ***[<port_list>]*** **[auto|authorized|unauthorized|single|multi|macbased]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **auto**: Port-based 802.1X Authentication **authorized**: Port access is allowed **unauthorized**: Port access is not allowed **single**: Single Host 802.1X Authentication **multi**: Multiple Host 802.1X Authentication **macbased**: Switch authenticates on behalf of the client (default: Show 802.1X state)
Default Setting	none

Example:

Show the port 1 security state.

```
SWITCH/>security network nas state 1

Port  Admin State         Port State            Last Source        Last ID
----  ------------------  --------------------  -----------------  -------------
1     Force Authorized    Link Down             -                  -
```

Console: Security Network NAS RADIUS_QoS	
Description	Set or show either global (use global keyword) or per-port enabledness of RADIUS-assigned QoS.
Syntax	`security network nas radius_qos` **[global|*<port_list>]* [enable|disable]**
Parameters	**global**: Select the global RADIUS-assigned QoS setting ***<port_list>***: Select the per-port RADIUS-assigned QoS setting (default: Show current per-port RADIUS-assigned QoS enabledness) **enable**: Enable RADIUS-assigned QoS either globally or on one or more ports **disable**: Disable RADIUS-assigned QoS either globally or on one or more ports (default: Show current RADIUS-assigned QoS enabledness)
Default Setting	disable

Example:

Enable NAS RADIUS QoS

```
SWITCH/>security network nas radius_qos enable
```

Console: Security Network NAS RADIUS_QoS	
Description	Set or show either global (use global keyword) or per-port enabledness of RADIUS-assigned VLAN.
Syntax	`security network nas radius_vlan` **[global|*<port_list>]* [enable|disable]**
Parameters	**global**: Select the global RADIUS-assigned VLAN setting ***<port_list>***: Select the per-port RADIUS-assigned VLAN setting (default: Show current per-port RADIUS-assigned VLAN enabledness) **enable** : Enable RADIUS-assigned VLAN either globally or on one or more ports **disable**: Disable RADIUS-assigned VLAN either globally or on one or more ports (default: Show current RADIUS-assigned VLAN enabledness)
Default Setting	disable

Example:

Enable NAS RADIUS VLAN

```
SWITCH/>security network nas radius_vlan enable
```

Console: Security Network NAS Guest VLAN	
Description	Set or show either global parameters (use global keyword) or per-port enabledness of Guest VLAN The ***<reauth_max>*** and <***allow_if_eapol_seen>*** parameters will be used if global is specified.
Syntax	`security network nas guest_vlan` **[global|*<port_list>]* [enable|disable]** ***[<vid>] [<reauth_max>] [<allow_if_eapol_seen>]***
Parameters	**global**: Select the global Guest VLAN setting ***<port_list>***: Select the per-port Guest VLAN setting (default: Show current per-port Guest VLAN enabledness) **enable|disable**: enable : Enable Guest VLAN either globally or on one or more ports **disable**: Disable Guest VLAN either globally or on one or more ports (default: Show current Guest VLAN enabledness) ***<vid>***: Guest VLAN ID used when entering the Guest VLAN. Use the 'global' keyword to change it (default: Show current Guest VLAN ID) ***<reauth_max>***: Value can only be set if 'global' is specified. The number of times a Request Identity EAPOL frame is sent without response before considering entering the Guest VLAN (default: Show current Maximum Reauth Count value) ***<allow_if_eapol_seen>***: Value can only be set if 'global' is specified. **disable**: The Guest VLAN can only be entered if no EAPOL frames have been received on a port for the lifetime of the port **enable** :The Guest VLAN can be entered even if an EAPOL frame has been received during the lifetime of the port (default: Show current setting)
Default Setting	disable

Example:

Enable NAS guest VLAN

```
SWITCH/>security network nas guest_vlan enable
```

Console: Security Network NAS Authenticate	
Description	Refresh (restart) 802.1X authentication process.
Syntax	`security network nas authenticate` ***[<port_list>]*** **[now]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **now**: Force reauthentication immediately

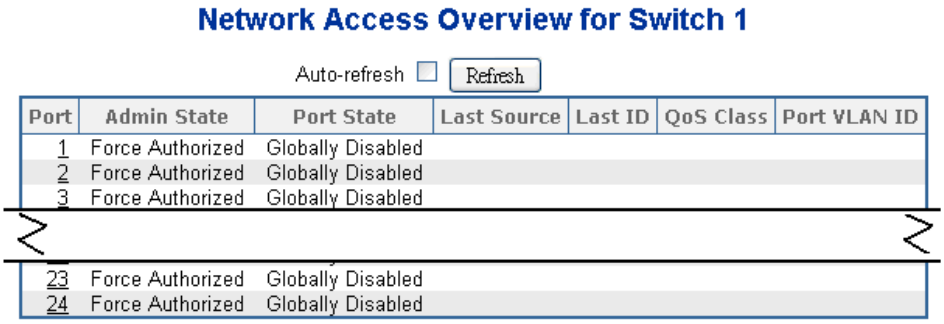
Example:

Start NAS authentication now for port 1.

```
SWITCH/>security network nas authenticate 1 now
```

4.10.3 Network Access Overview

This page provides an overview of the current NAS port states for the selected switch.

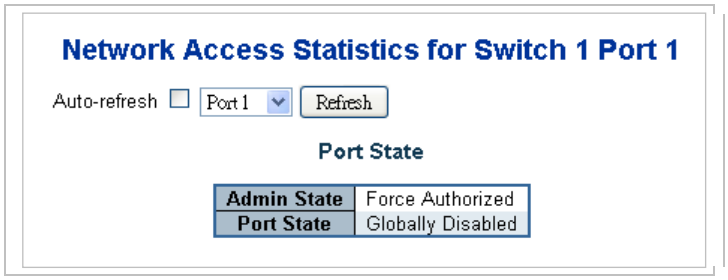


The page includes the following fields:

Object	Description
Port	The switch port number. Click to navigate to detailed NAS statistics for this port.
Admin State	The port's current administrative state.
Port State	The current state of the port.
Last Source	The source MAC address carried in the most recently received EAPOL frame for EAPOL-based authentication, and the most recently received frame from a new client for MAC-based authentication.
Last ID	The user name (supplicant identity) carried in the most recently received Response Identity EAPOL frame for EAPOL-based authentication, and the source MAC address from the most recently received frame from a new client for MAC-based authentication.
Port VLAN ID	The VLAN ID that NAS has put the port in. The field is blank, if the Port VLAN ID is not overridden by NAS. If the VLAN ID is assigned by the RADIUS server, "(RADIUS-assigned)" is appended to the VLAN ID. If the port is moved to the Guest VLAN, "(Guest)" is appended to the VLAN ID.

4.10.4 Network Access Statistics

This page provides detailed NAS statistics for a specific switch port running EAPOL-based IEEE 802.1X authentication. For MAC-based ports, it shows selected backend server (RADIUS Authentication Server) statistics, only. Use the port select box to select which port details to be displayed.



The page includes the following fields:

- **Port State**

Object	Description
Admin State	The port's current administrative state.
Port State	The current state of the port.
QoS Class	The QoS class assigned by the RADIUS server. The field is blank if no QoS class is assigned.
Port VLAN ID	The VLAN ID that NAS has put the port in. The field is blank, if the Port VLAN ID is not overridden by NAS. If the VLAN ID is assigned by the RADIUS server, "(RADIUS-assigned)" is appended to the VLAN ID. If the port is moved to the Guest VLAN, "(Guest)" is appended to the VLAN ID.

- **Port Counters**

<table>
<tr><th>Object</th><th colspan="4">Description</th></tr>
<tr><td rowspan="7">EAPOL Counters</td><td colspan="4">These supplicant frame counters are available for the following administrative states:
• Force Authorized
• Force Unauthorized
• Port-based 802.1X
• Single 802.1X
• Multi 802.1X</td></tr>
<tr><td>Direction</td><td>Name</td><td>IEEE Name</td><td>Description</td></tr>
<tr><td>Rx</td><td>Total</td><td>dot1xAuthEapolFramesRx</td><td>The number of valid EAPOL frames of any type that have been received by the switch.</td></tr>
<tr><td>Rx</td><td>Response ID</td><td>dot1xAuthEapolRespIdFramesRx</td><td>The number of valid EAPOL Response Identity frames that have been received by the switch.</td></tr>
<tr><td>Rx</td><td>Responses</td><td>dot1xAuthEapolRespFramesRx</td><td>The number of valid EAPOL response frames (other than Response Identity frames) that have been received by the switch.</td></tr>
<tr><td>Rx</td><td>Start</td><td>dot1xAuthEapolStartFramesRx</td><td>The number of EAPOL Start frames that have been received by the switch.</td></tr>
<tr><td>Rx</td><td>Logoff</td><td>dot1xAuthEapolLogoffFramesRx</td><td>The number of valid EAPOL Logoff frames that have been received by the switch.</td></tr>
</table>

	Rx	Invalid Type	dot1xAuthInvalidEapolFramesRx	The number of EAPOL frames that have been received by the switch in which the frame type is not recognized.
	Rx	Invalid Length	dot1xAuthEapLengthErrorFramesRx	The number of EAPOL frames that have been received by the switch in which the Packet Body Length field is invalid.
	Tx	Total	dot1xAuthEapolFramesTx	The number of EAPOL frames of any type that have been transmitted by the switch.
	Tx	Request ID	dot1xAuthEapolReqIdFramesTx	The number of EAPOL Request Identity frames that have been transmitted by the switch.
	Tx	Requests	dot1xAuthEapolReqFramesTx	The number of valid EAPOL Request frames (other than Request Identity frames) that have been transmitted by the switch.
Backend Server Counters	These backend (RADIUS) frame counters are available for the following administrative states: • Port-based 802.1X • Single 802.1X • Multi 802.1X • MAC-based Auth.			
	Direction	Name	IEEE Name	Description
	Rx	Access Challenges	dot1xAuthBackendAccessChallenges	802.1X-based: Counts the number of times that the switch receives the first request from the backend server following the first response from the supplicant. Indicates that the backend server has communication with the switch. MAC-based: Counts all Access Challenges received from the backend server for this port (left-most table) or client (right-most table).
	Rx	Other Requests	dot1xAuthBackendOtherRequestsToSupplicant	802.1X-based: Counts the number of times that the switch sends an EAP Request packet following the first to the supplicant. Indicates that the backend server chose an EAP-method. MAC-based: Not applicable.
	Rx	Auth. Successes	dot1xAuthBackendAuthSuccesses	802.1X- and MAC-based: Counts the number of times that the switch receives a success indication. Indicates that the supplicant/client has successfully authenticated to the backend server.
	Rx	Auth. Failures	dot1xAuthBackendAuthFails	802.1X- and MAC-based: Counts the number of times that the switch receives a failure message. This indicates that the supplicant/client has not authenticated to the backend server.
	Tx	Responses	dot1xAuthBackendResponses	802.1X-based: Counts the number of times that the switch attempts to send a supplicant's first response packet to

				the backend server. Indicates the switch attempted communication with the backend server. Possible retransmissions are not counted. MAC-based: Counts all the backend server packets sent from the switch towards the backend server for a given port (left-most table) or client (right-most table). Possible retransmissions are not counted.
Last Supplicant/Client Info	Information about the last supplicant/client that attempted to authenticate. This information is available for the following administrative states: • Port-based 802.1X • Single 802.1X • Multi 802.1X • MAC-based Auth.			
	Name	IEEE Name	Description	
	MAC Address	dot1xAuthLastEapolFrameSource	The MAC address of the last supplicant/client.	
	VLAN ID	-	The VLAN ID on which the last frame from the last supplicant/client was received.	
	Version	dot1xAuthLastEapolFrameVersion	802.1X-based: The protocol version number carried in the most recently received EAPOL frame. MAC-based: Not applicable.	
	Identity	-	802.1X-based: The user name (supplicant identity) carried in the most recently received Response Identity EAPOL frame. MAC-based: Not applicable.	

- **Selected Counters**

Object	Description
Selected Counters	The Selected Counters table is visible when the port is one of the following administrative states: • Multi 802.1X • MAC-based Auth. The table is identical to and is placed next to the Port Counters table, and will be empty if no MAC address is currently selected. To populate the table, select one of the attached MAC Addresses from the table below.

- **Port Counters**

Object	Description
Identity	Shows the identity of the supplicant. Clicking the link causes the supplicant's EAPOL and Backend Server counters to be shown in the Selected Counters table. If no supplicants are attached, it shows No supplicants attached. This column is not available for MAC-based Auth.
MAC Address	For Multi 802.1X, this column holds the MAC address of the attached supplicant. For MAC-based Auth., this column holds the MAC address of the attached client. Clicking the link causes the client's Backend Server counters to be shown in the Selected Counters table. If no clients are attached, it shows No clients attached.
VLAN ID	This column holds the VLAN ID that the corresponding client is currently secured through the Port Security module.

State	the authenticated state, it is allowed to forward frames on the port, and in the unauthenticated state, it is blocked. As long as the backend server hasn't successfully authenticated the client, it is unauthenticated. If an authentication fails for one or the other reason, the client will remain in the unauthenticated state for Hold Time seconds.
Last Authentication	Shows the date and time of the last authentication of the client (successful as well as unsuccessful).

Buttons

Clear: Click to clear the counters for the selected port. This button is available in the following modes:

- Force Authorized
- Force Unauthorized
- Port-based 802.1X
- Single 802.1X

Clear All: Click to clear both the port counters and all of the attached client's counters. The "Last Client" will not be cleared.

This button is available in the following modes:

- Multi 802.1X
- MAC-based Auth.X

Clear This: This button is available in the following modes:

- Multi 802.1X
- MAC-based Auth.X
- Click to clear only the currently selected client's counters.

Console: Security Network NAS Statistics	
Description	Show or clear 802.1X statistics.
Syntax	`security network nas statistics` ***[<port_list>]*** **`[clear|eapol|radius]`**
Parameters	***<port_list>***: Port list or 'all', default: All ports **clear**: Clear statistics **eapol**: Show EAPOL statistics **radius**: Show Backend Server statistics (default: Show all statistics)

Example:

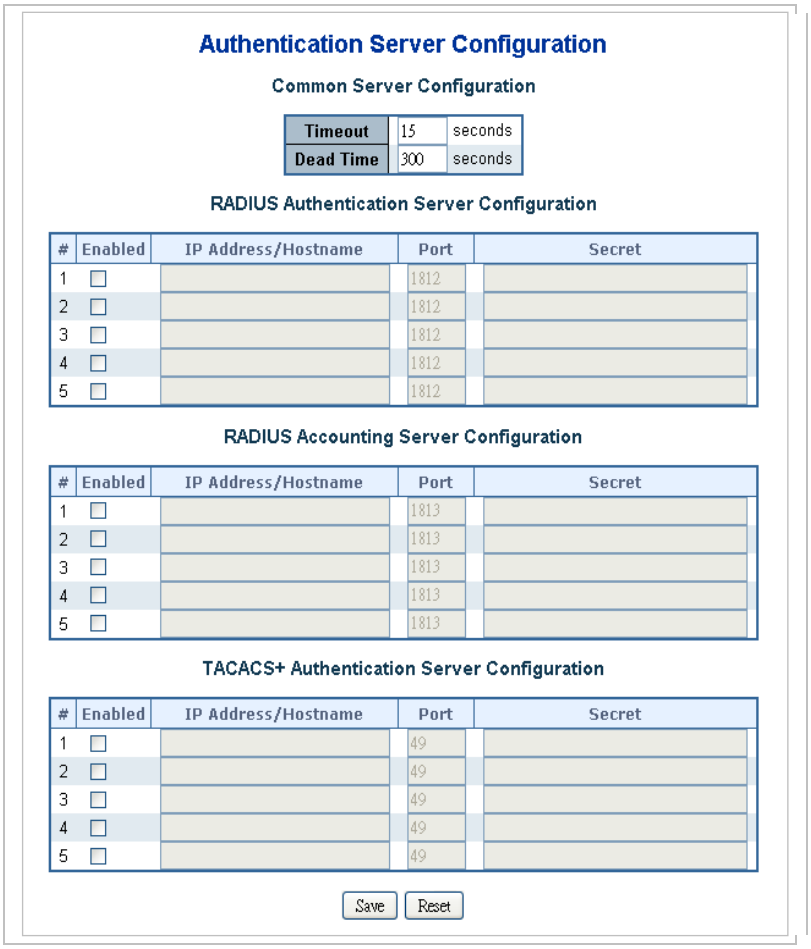
Show 802.1X statistics in port 1

```
SWITCH/>security network nas statistics 1
Port 1 EAPOL Statistics:

Rx Total:                         0   Tx Total:                         0
Rx Response/Id:                   0   Tx Request/Id:                    0
Rx Response:                      0   Tx Request:                       0
Rx Start:                         0
Rx Logoff:                        0
Rx Invalid Type:                  0
Rx Invalid Length:                0

Port 1 Backend Server Statistics:

Rx Access Challenges:             0   Tx Responses:                     0
Rx Other Requests:                0
```

```
Rx Auth. Successes:                 0
Rx Auth. Failures:                  0
```

4.10.5 Authentication Server Configuration

This webpage allows you to configure the Authentication Servers.



The page includes the following fields:

- **Port State**

These setting are common for all of the Authentication Servers.

Object	Description
Timeout	The Timeout, which can be set to a number between 3 and 3600 seconds, is the maximum time to wait for a reply from a server. If the server does not reply within this timeframe, we will consider it to be dead and continue with the next enabled server (if any).
Dead Time	The Dead Time, which can be set to a number between 0 and 3600 seconds, is the period during which the switch will not send new requests to a server that has failed to respond to a previous request. This will stop the switch from continually trying to contact a server that it has already determined as dead. Setting the Dead Time to a value greater than 0 (zero) will enable this feature, but only if more than one server has been configured.

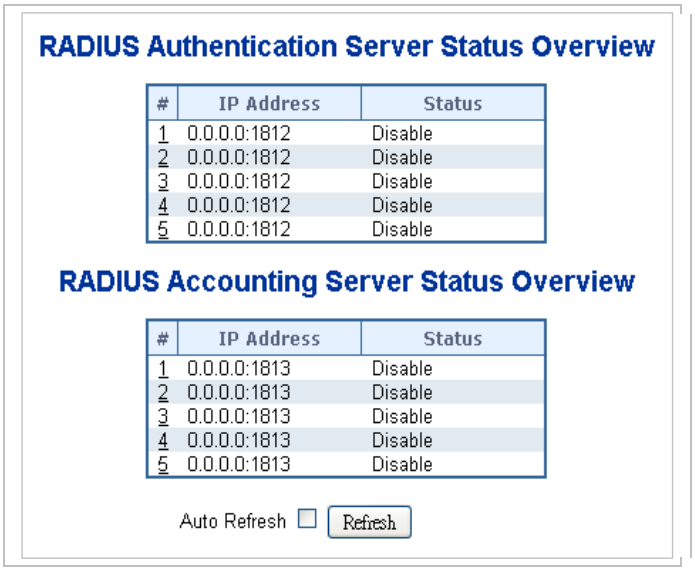
➢ **Server Configuration**

The table contains one row for each RADIUS Authentication Server, RADIUS Accounting Server and TACACS+ Authentication Server, respectively. The columns display the following information and options:

Object	Description
#	The Authentication Server number for which the configuration below applies.
Enabled	Enable the corresponding Authentication Server by checking this box.
IP Address/Hostname	The IP address or hostname of the Authentication Server. IP address is expressed in dotted decimal notation.
Port	The UDP port to use on the Authentication Server. If the port is set to 0 (zero), the default port is used. (1812 for RADIUS Authentication Server, 1813 for RADIUS Accounting Server, and 49 for TACACS+ Authentication Server)
Secret	The password - up to 29 characters long - shared between the Authentication Server and the switch.

4.10.6 RADIUS Overview

This page provides an overview of the status of the RADIUS servers configurable on the Authentication configuration page.



The page includes the following fields:

➢ **RADIUS Authentication/Accounting Server Status Overview**

Object	Description
#	The RADIUS server number. Click to navigate to detailed statistics for this server.
IP Address	The IP address and UDP port number (in <IP Address>:<UDP Port> notation) of this server.
State	The current state of the server. This field takes one of the following values: • **Disabled**: The server is disabled. • **Not Ready**: The server is enabled, but IP communication is not yet up and running. • **Ready**: The server is enabled, IP communication is up and running, and the RADIUS module

	is ready to accept access attempts. • **Dead (X seconds left)**: Access attempts were made to this server, but it did not reply within the configured timeout. The server has temporarily been disabled, but will get re-enabled when the dead-time expires. The number of seconds left before this occurs is displayed in parentheses. This state is only reachable when more than one server is enabled.

Console: Security AAA Configuration	
Description	Show Auth configuration.
Syntax	`security aaa configuration`

Example:

Show Auth configuration.

```
SWITCH/>security aaa configuration

AAA Configuration:
==================



Server Timeout   : 15 seconds

Server Dead Time : 300 seconds

RADIUS Authentication Server Configuration:
===========================================
Server  Mode      IP Address       Secret                          Port
------  --------  ---------------  ------------------------------  -----
1       Disabled                                                   1812
2       Disabled                                                   1812
3       Disabled                                                   1812
4       Disabled                                                   1812
5       Disabled                                                   1812

RADIUS Accounting Server Configuration:
=======================================
Server  Mode      IP Address       Secret                          Port
------  --------  ---------------  ------------------------------  -----
1       Disabled                                                   1813
2       Disabled                                                   1813
3       Disabled                                                   1813
4       Disabled                                                   1813
5       Disabled                                                   1813

TACACS+ Authentication Server Configuration:
============================================
Server  Mode      IP Address       Secret                          Port
------  --------  ---------------  ------------------------------  -----
1       Disabled                                                     49
2       Disabled                                                     49
3       Disabled                                                     49
4       Disabled                                                     49
5       Disabled                                                     49
```

Console: Security AAA Timeout	
Description	Set or show server timeout.
Syntax	`security aaa timeout` ***[<timeout>]***
Parameters	***<timeout>***: Server response timeout (3-3600 seconds) (default: Show server timeout configuration)

Example:

Set 30sec for server timeout

```
SWITCH/>security aaa timeout 30
```

Console: Security AAA Deadtime	
Description	Set or show server dead time.
Syntax	`security aaa deadtime` ***[<dead_time>]***
Parameters	***<dead_time>***: Time that a server is considered dead if it doesn't answer a request (0-3600 seconds) (default: Show server dead time configuration)
Default Setting	300

Example:

Set 1000sec for server dead time

```
SWITCH/>security aaa deadtime 1000
```

Console: Security AAA RADIUS	
Description	Set or show RADIUS authentication server setup.
Syntax	`security aaa radius` ***[<server_index>]*** **[enable|disable]** ***[<ip_addr_string>] [<secret>] [<server_port>]***
Parameters	The server index (1-5) (default: Show RADIUS authentication server configuration) **enable**: Enable RADIUS authentication server **disable**: Disable RADIUS authentication server (default: Show RADIUS server mode) ***<ip_addr_string>***: IP host address (a.b.c.d) or a host name string ***<secret>*** : Secret shared with external authentication server. To set an empty secret, use two quotes (""). To use spaces in secret, enquote the secret. Quotes in the secret itself are not allowed. ***<server_port>***: Server UDP port. Use 0 to use the default RADIUS port (1812)

Example:

Set RADIUS authentication server configuration.

```
SWITCH/>security aaa radius 1 enable 192.168.0.20 12345678 1812
```

Console: Security AAA ACCT_RADIUS	
Description	Set or show RADIUS accounting server setup.
Syntax	`security aaa acct_radius` ***[<server_index>]*** **[enable|disable]** ***[<ip_addr_string>] [<secret>] [<server_port>]***
Parameters	The server index (1-5) (default: Show RADIUS accounting server configuration) **enable**: Enable RADIUS accounting server **disable**: Disable RADIUS accounting server (default: Show RADIUS server mode) ***<ip_addr_string>***: IP host address (a.b.c.d) or a host name string ***<secret>*** : Secret shared with external accounting server. To set an empty secret, use two quotes (""). To use spaces in secret, enquote the secret. Quotes in the secret itself are not allowed. ***<server_port>*** : Server UDP port. Use 0 to use the default RADIUS port (1813)

Example:

Set RADIUS accounting server configuration.

```
SWITCH/>security acct_radius 1 enable 192.168.0.20 12345678 1813
```

Console: Security AAA TACACS+	
Description	Set or show TACACS+ authentication server setup.
Syntax	`security aaa tacacs+` ***[<server_index>]*** **[enable|disable]** ***[<ip_addr_string>] [<secret>] [<server_port>]***
Parameters	The server index (1-5) (default: Show TACACS+ authentication server configuration) **enable**: Enable TACACS+ authentication server **disable**: Disable TACACS+ authentication server (default: Show TACACS+ server mode)

	<ip_addr_string>: IP host address (a.b.c.d) or a host name string ***<secret>***: Secret shared with external authentication server. To set an empty secret, use two quotes (""). To use spaces in secret, enquote the secret. Quotes in the secret are not allowed. ***<server_port>***: Server TCP port. Use 0 to use the default TACACS+ port (49)

Example:

Set TACACS+ authentication server configuration.

```
SWITCH/>security aaa tacacs+ 1 enable 192.168.0.20 12345678 49
```

4.10.7 RADIUS Details

This page provides detailed statistics for a particular RADIUS server.

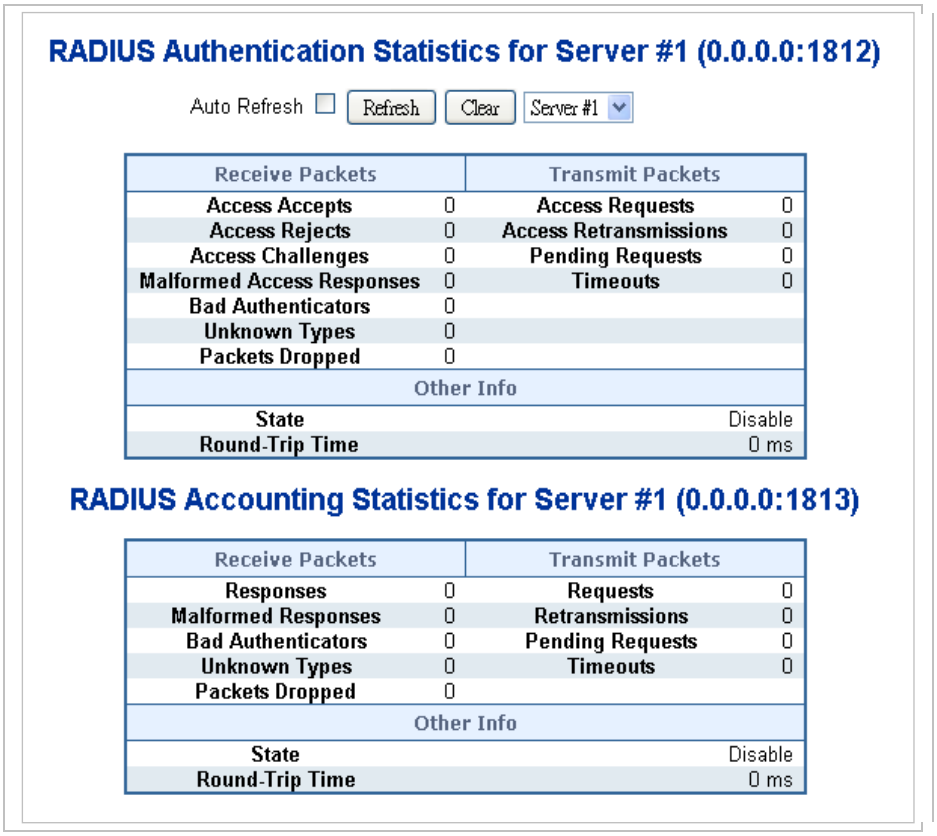


Figure 4-9 *- RADIUS Server Statistics overview by Authentication/Accounting*

The page includes the following fields:

- **RADIUS Authentication Servers**

The statistics map closely to those specified in RFC4668 - RADIUS Authentication Client MIB. Use the server select box to switch between the backend servers to show details for.

Object	Description			
Packet Counters	RADIUS authentication server packet counter. There are seven receive and four transmit counters.			
	Direction	Name	RFC4668 Name	Description

	Rx	Access Accepts	radiusAuthClientExtAccessAccepts	The number of RADIUS Access-Accept packets (valid or invalid) received from the server.
	Rx	Access Rejects	radiusAuthClientExtAccessRejects	The number of RADIUS Access-Reject packets (valid or invalid) received from the server.
	Rx	Access Challenges	radiusAuthClientExtAccessChallenges	The number of RADIUS Access-Challenge packets (valid or invalid) received from the server.
	Rx	Malformed Access Responses	radiusAuthClientExtMalformedAccessResponses	The number of malformed RADIUS Access-Response packets received from the server. Malformed packets include packets with an invalid length. Bad authenticators or Message Authenticator attributes or unknown types are not included as malformed access responses.
	Rx	Bad Authenticators	radiusAuthClientExtBadAuthenticators	The number of RADIUS Access-Response packets containing invalid authenticators or Message Authenticator attributes received from the server.
	Rx	Unknown Types	radiusAuthClientExtUnknownTypes	The number of RADIUS packets that were received from the server on the authentication port and dropped for some other reason.
	Rx	Packets Dropped	radiusAuthClientExtPacketsDropped	The number of RADIUS packets that were received from the server on the authentication port and dropped for some other reason.
	Tx	Access Requests	radiusAuthClientExtAccessRequests	The number of RADIUS Access-Request packets sent to the server. This does not include retransmissions.
	Tx	Access Retransmissions	radiusAuthClientExtAccessRetransmissions	The number of RADIUS Access-Request packets retransmitted to the RADIUS authentication server.
	Tx	Pending Requests	radiusAuthClientExtPendingRequests	The number of RADIUS Access-Request packets destined for the server that have not yet timed out or received a response. This variable is incremented when an Access-Request is sent and decremented due to receipt of an Access-Accept, Access-Reject, Access-Challenge, timeout, or retransmission.
	Tx	Timeouts	radiusAuthClientExtTimeouts	The number of authentication timeouts to the server. After a timeout, the client may retry to the same server, send to a different server, or give up. A retry to the same server is counted as a retransmit as well as a timeout. A send to a

<table>
<tr><td></td><td></td><td></td><td></td><td>different server is counted as a Request as well as a timeout.</td></tr>
<tr><td rowspan="4">Other Info</td><td colspan="4">This section contains information about the state of the server and the latest round-trip time.</td></tr>
<tr><td>Name</td><td>RFC4668 Name</td><td colspan="2">Description</td></tr>
<tr><td>State</td><td>-</td><td colspan="2">Shows the state of the server. It takes one of the following values:
Disabled: The selected server is disabled.
Not Ready: The server is enabled, but IP communication is not yet up and running.
Ready: The server is enabled, IP communication is up and running, and the RADIUS module is ready to accept access attempts.
Dead (X seconds left): Access attempts were made to this server, but it did not reply within the configured timeout. The server has temporarily been disabled, but will get re-enabled when the dead-time expires. The number of seconds left before this occurs is displayed in parentheses. This state is only reachable when more than one server is enabled.</td></tr>
<tr><td>Round-Trip Time</td><td>radiusAuthClientExtRoundTripTime</td><td colspan="2">The time interval (measured in milliseconds) between the most recent Access-Reply/Access-Challenge and the Access-Request that matched it from the RADIUS authentication server. The granularity of this measurement is 100 ms. A value of 0 ms indicates that there hasn't been round-trip communication with the server yet.</td></tr>
</table>

- **RADIUS Accounting Servers**

The statistics map closely to those specified in RFC4670 - RADIUS Accounting Client MIB. Use the server select box to switch between the backend servers to show details for.

<table>
<tr><th>Object</th><th colspan="4">Description</th></tr>
<tr><td rowspan="7">Packet Counters</td><td colspan="4">RADIUS accounting server packet counter. There are five receive and four transmit counters.</td></tr>
<tr><td>Direction</td><td>Name</td><td>RFC4670 Name</td><td>Description</td></tr>
<tr><td>Rx</td><td>Responses</td><td>radiusAccClientExtResponses</td><td>The number of RADIUS packets (valid or invalid) received from the server.</td></tr>
<tr><td>Rx</td><td>Malformed Responses</td><td>radiusAccClientExtMalformedResponses</td><td>The number of malformed RADIUS packets received from the server. Malformed packets include packets with an invalid length. Bad authenticators or unknown types are not included as malformed access responses.</td></tr>
<tr><td>Rx</td><td>Bad Authenticators</td><td>radiusAcctClientExtBadAuthenticators</td><td>The number of RADIUS packets containing invalid authenticators received from the server.</td></tr>
<tr><td>Rx</td><td>Unknown Types</td><td>radiusAccClientExtUnknownTypes</td><td>The number of RADIUS packets of unknown types that were received from the server on the accounting port.</td></tr>
<tr><td>Rx</td><td>Packets Dropped</td><td>radiusAccClientExtPacketsDropped</td><td>The number of RADIUS packets that were received from the server on the accounting port and dropped for some other reason.</td></tr>
</table>

	Tx	Requests	radiusAccClientExtRequests	The number of RADIUS packets sent to the server. This does not include retransmissions.
	Tx	Retransmissions	radiusAccClientExtRetransmissions	The number of RADIUS packets retransmitted to the RADIUS accounting server.
	Tx	Pending Requests	radiusAccClientExtPendingRequests	The number of RADIUS packets destined for the server that have not yet timed out or received a response. This variable is incremented when a Request is sent and decremented due to receipt of a Response, timeout, or retransmission.
	Tx	Timeouts	radiusAccClientExtTimeouts	The number of accounting timeouts to the server. After a timeout, the client may retry to the same server, send to a different server, or give up. A retry to the same server is counted as a retransmit as well as a timeout. A send to a different server is counted as a Request as well as a timeout.

Other Info	This section contains information about the state of the server and the latest round-trip time.		
	Name	RFC4670 Name	Description
	State	-	Shows the state of the server. It takes one of the following values: **Disabled:** The selected server is disabled. **Not Ready:** The server is enabled, but IP communication is not yet up and running. **Ready:** The server is enabled, IP communication is up and running, and the RADIUS module is ready to accept accounting attempts. **Dead (X seconds left):** Accounting attempts were made to this server, but it did not reply within the configured timeout. The server has temporarily been disabled, but will get re-enabled when the dead-time expires. The number of seconds left before this occurs is displayed in parentheses. This state is only reachable when more than one server is enabled.
	Round-Trip Time	radiusAccClientExtRoundTripTime	The time interval (measured in milliseconds) between the most recent Response and the Request that matched it from the RADIUS accounting server. The granularity of this measurement is 100 ms. A value of 0 ms indicates that there hasn't been round-trip communication with the server yet.

Console: Security AAA Statistics	
Description	Show RADIUS statistics.
Syntax	`security aaa statistics` ***[<server_index>]***
Parameters	The server index (1-5) (default: Show statistics for all servers)

Example:

Show RADIUS statistics.

```
SWITCH/>security aaa statistics
```

4.11 Security

This section is to control the access of the Managed Switch, includes the user access and management control. The Security page contains links to the following main topics:

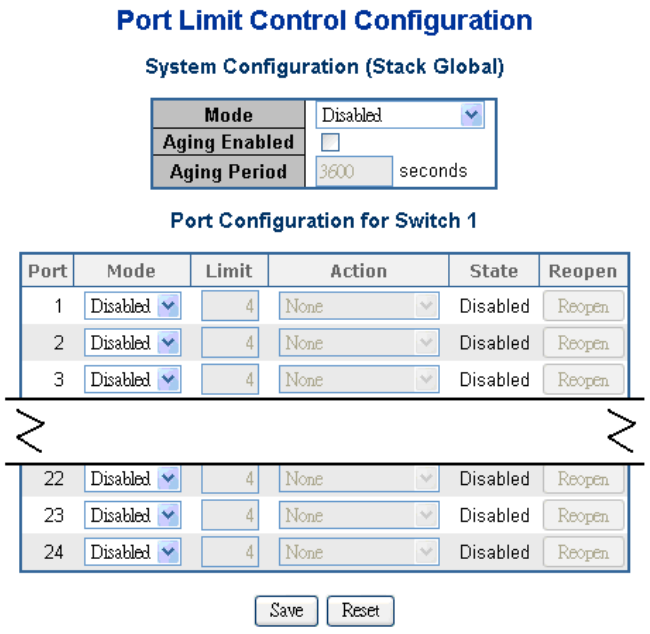
- Port Limit Control
- Access Management
- HTTPs / SSH
- DHCP Snooping
- IP Source Guard
- ARP Inspection

4.11.1 Port Limit Control

This page allows you to configure the Port Security Limit Control system and port settings.

If Limit Control is enabled on a port, the limit specifies the maximum number of users on the port as identified by a user's MAC address and VLAN ID. If this number is exceeded, an action is taken. The action can be one of four different as described below. The Limit Control module is one of a range of modules that utilizes a lower-layer module, the Port Security module, which manages MAC addresses learned on the port.

The Limit Control configuration consists of two sections, a system- and a port-wide configuration page.



The page includes the following fields:

➢ **System Configuration**

Object	Description

Mode	Indicates if Limit Control is globally enabled or disabled on the switch stack. If globally disabled, other modules may still use the underlying functionality, but limit checks and corresponding actions are disabled.
Aging Enabled	If checked, secured MAC addresses are subject to aging.
Aging Period	If Aging Enabled is checked, then the aging period is controlled with this input. If other modules are using the underlying port security for securing MAC addresses, the shorter requested aging period is used. The Aging Period can be set to a number between ***10*** and ***10,000,000*** seconds.

- **Port Configuration**

The table has one row for each port on the selected switch in the stack and a number of columns, which are:

Object	Description
Port	The port number for which the configuration below applies.
Mode	Controls whether Limit Control is enabled on this port. Both this and the Global Mode must be set to **Enabled** for Limit Control to be in effect. Notice that other modules may still use the underlying port security features without enabling Limit Control on a given port.
Limit	The maximum number of MAC addresses that can be secured on this port. This number cannot exceed 1024. If the limit is exceeded, the corresponding action is taken.
Action	If Limit is reached, the switch can take one of the following actions: • **None**: Do not allow more than Limit MAC addresses on the port, but take no further action. • **Trap**: If Limit + 1 MAC addresses is seen on the port, send an SNMP trap. If Aging is disabled, only one SNMP trap will be sent. With Aging enabled, new SNMP traps will be sent every time the limit gets exceeded. • **Shutdown**: If Limit + 1 MAC addresses is seen, shut down the port. All secured MAC addresses will be removed from the port, and no new addresses will be learned even if the link is physically disconnected and reconnected. There are three ways to re-open the port: 1. Boot the stack or elect a new master switch, 2. Disable and re-enable Limit Control on the port or the stack switch, 3. Click the **Reopen** button. • **Trap & Shutdown**: If Limit + 1 MAC addresses is seen on the port, both the "**Trap**" and the "**Shutdown**" actions described above will be taken.
State	This column shows the current state of the port as seen from the Limit Control's point of view. The state takes one of four values: • **Disabled**: Limit Control is either globally disabled or disabled on the port. • **Ready**: The limit is not yet reached. This can be shown for all actions. • **Limit Reached**: Indicates that the limit is reached on this port. This state can only be shown if Action is set to "**None**" or "**Trap**." • **Shutdown**: Indicates that the port is shut down by the Limit Control module. This state can only be shown if Action is set to "**Shutdown**" or "**Trap & Shutdown**."
Reopen Button	If a port is shutdown by this module, you may reopen it by clicking this button, which will only be enabled if this is the case. For other methods, refer to "**Shutdown**" in the Action section. Note that clicking the reopen button causes the page to be refreshed; unsaved changes will be lost.

Console: Security Network Limit Port	
Description	Set or show per-port enabledness.
Syntax	`security network limit port` ***[<port_list>]*** **[enable|disable]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable port security on this port **disable**: Disable port security on this port (default: Show current port enabledness of port security limit control)
Default Setting	disable

Example:

Enable port limit for port 1

```
SWITCH/>security network limit port 1 enable
```

Console: Security Network Limit	
Description	Set or show the max. number of MAC addresses that can be learned on this set of ports.
Syntax	`security network limit limit` ***[<port_list>] [<limit>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports ***<limit>***: Max. number of MAC addresses on this port (default: Show current limit)
Default Setting	4

Example:

Set limit in 5

```
SWITCH/>security network limit limit 1-24 5
```

Console: Security Network Limit Configuration	
Description	Show Limit Control configuration.
Syntax	`security network limit configuration` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports

Example:

Show Limit Control configuration.

```
SWITCH/>security network limit configuration

Port Security Limit Control Configuration:
==========================================

Mode      : Disabled
Aging     : Disabled
Age Period: 3600

Port  Mode       Limit  Action
----  --------   -----  ---------------
1     Disabled       4  None
2     Disabled       4  None
3     Disabled       4  None
4     Disabled       4  None
5     Disabled       4  None
6     Disabled       4  None
7     Disabled       4  None
8     Disabled       4  None
9     Disabled       4  None
10    Disabled       4  None
11    Disabled       4  None
12    Disabled       4  None
13    Disabled       4  None
14    Disabled       4  None
15    Disabled       4  None
16    Disabled       4  None
17    Disabled       4  None
18    Disabled       4  None
19    Disabled       4  None
20    Disabled       4  None
21    Disabled       4  None
22    Disabled       4  None
23    Disabled       4  None
24    Disabled       4  None
```

Console: Security Network Limit Mode	
Description	Set or show global enabledness.
Syntax	`security network limit mode` **[enable|disable]**
Parameters	**enable** : Globally enable port security

	disable : Globally disable port security (default: Show current global enabledness of port security limit control)
Default Setting	disable

Example:

Enable the limit mode

```
SWITCH/>security network limit mode enable
```

Console: Security Network Limit Aging	
Description	Set or show aging enabledness.
Syntax	`security network limit aging` **`[enable|disable]`**
Parameters	**enable**: Enable aging **disable**: Disable aging (default: Show current enabledness of aging)
Default Setting	Disable

Example:

Enable limit aging

```
SWITCH/>security network limit aging enable
```

Console: Security Network Limit Agetime	
Description	Time in seconds between checking for activity on learned MAC addresses.
Syntax	`security network limit agetime` ***[<age_time>]***
Parameters	***<age_time>***: Time in seconds between checks for activity on a MAC address (10-10000000 seconds) (default: Show current age time)
Default Setting	3600

Example:

Set age time in 100sec.

```
SWITCH/>security network limit agetime 100
```

Console: Security Network Limit Action	
Description	Set or show the action involved with exceeding the limit.
Syntax	`security network limit action` ***[<port_list>]*** **`[none|trap|shut|trap_shut]`**
Parameters	***<port_list>***: Port list or 'all', default: All ports **none|trap|shut|trap_shut**: Action to be taken in case the number of MAC addresses exceeds the limit **none**: No action **trap**: Send an SNMP trap **shut**: Shutdown the port **trap_shut**: Send an SNMP trap and shutdown the port (default: Show current action)
Default Setting	none

Example:

Set trap mode for limit action for port 1

```
SWITCH/>security network limit action 1 trap
```

Console: Security Network Limit Reopen	
Description	Reopen one or more ports whose limit is exceeded and shut down.

Syntax	`security network limit reopen` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports
Default Setting	none

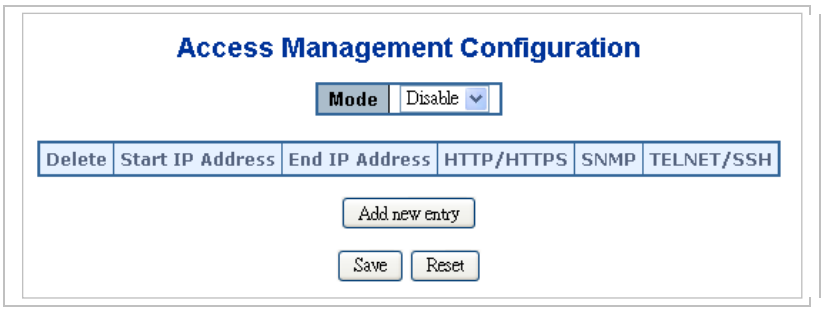
Example:

Reopen port 1

```
SWITCH/>security network limit reopen 1
```

4.11.2 Access Management

Configure access management table on this page. The maximum entry number is 16. If the application's type matches any one of access management entry, it will allow access to the switch.



The page includes the following fields:

Object	Description
Mode	Indicates the access management mode operation. Possible modes are: • **Enabled**: Enable access management mode operation. • **Disabled**: Disable access management mode operation.
Delete	Check to delete the entry. It will be deleted during the next save.
Start IP address	Indicates the start IP address for the access management entry.
End IP address	Indicates the end IP address for the access management entry.
HTTP/HTTPS	Indicates the host can access the switch from HTTP/HTTPS interface that the host IP address matched the entry.
SNMP	Indicates the host can access the switch from SNMP interface that the host IP address matched the entry.
TELNET/SSH	Indicates the host can access the switch from TELNET/SSH interface that the host IP address matched the entry.

Buttons

Add new entry: Click to add a new access management entry.

Console: Security Switch Access Configuration	
Description	Show access management configuration.
Syntax	`security switch access configuration`

Example:

Show access management configuration.

```
SWITCH/>security switch access configuration

Access Mgmt Configuration:
==========================

System Access Mode : Disabled
System Access number of entries: 0
```

Console: Security Switch Access Mode	
Description	Set or show the access management mode.
Syntax	`security switch access mode` **`[enable|disable]`**
Parameters	**enable** : Enable access management **disable**: Disable access management (default: Show access management mode)
Default Setting	disable

Example:

Enable access management function.

```
SWITCH/>security switch access mode enable
```

Console: Security Switch Access Add	
Description	Add access management entry.
Syntax	`security switch access add` ***<access_id> <start_ip_addr> <end_ip_addr>*** **`[web|snmp|telnet]`**
Parameters	***<access_id>***: entry index (1-16) ***<start_ip_addr>***: Start IP address (a.b.c.d) ***<end_ip_addr>***: End IP address (a.b.c.d) **web**: WEB/HTTPS interface **snmp**: SNMP interface **telnet**: TELNET/SSH interface (default: Show configured and current mode)

Example:

\Add access management list from 192.168.0.1 to 192.168.0.200 via web interface.

```
SWITCH/>security switch access add 1 192.168.0.1 192.168.0.200 web
```

Console: Security Switch Access IPv6 Add	
Description	Add access management IPv6 entry.
Syntax	`security switch access ipv6 add` **<access_id> <start_ipv6_addr> <end_ipv6_addr> [web|snmp|telnet]**
Parameters	***<access_id>***: entry index (1-16) ***<start_ipv6_addr>***: Start IPv6 address. ***<end_ipv6_addr>***: End IPv6 address. **web**: WEB/HTTPS interface **snmp**: SNMP interface **telnet**: TELNET/SSH interface (default: Show configured and current mode)

Example:

Add access management list from 2001::0001 to 2001::0100 via web interface.

```
SWITCH/> security switch access add 2001::0001 2001::0100 web
```

Console: Security Switch Access Delete	
Description	Delete access management entry.
Syntax	`security switch access delete` ***<access_id>***

Parameters	***<access_id>***: entry index (1-16)

Example:

Delete access management ID 1

```
SWITCH/>security switch access delete 1
```

Console: Security Switch Access Lookup	
Description	Lookup access management entry.
Syntax	`security switch access lookup` ***[<access_id>]***
Parameters	***<access_id>***: entry index (1-16)

Example:

Lookup access management entry.

```
SWITCH/>security switch access lookup 1
```

Console: Security Switch Access Clear	
Description	Clear access management entry.
Syntax	`security switch access clear`

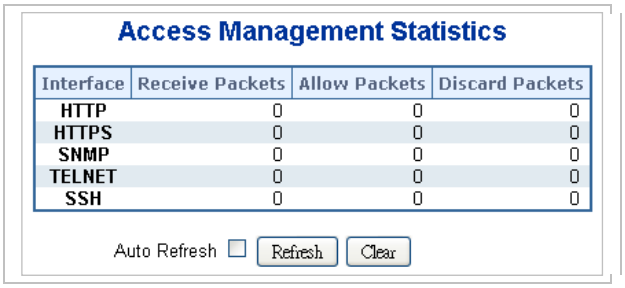
Example:

Clear access management entry.

```
SWITCH/>security switch access clear
```

4.11.3 Access Management Statistics

This page provides statistics for access management.



The page includes the following fields:

Object	Description
Interface	The interface that allowed remote host can access the switch.
Receive Packets	The received packets number from the interface under access management mode is enabled.
Allow Packets	The allowed packets number from the interface under access management mode is enabled.
Discard Packets	The discarded packets number from the interface under access management mode is enabled.

Console: Security Switch Access Statistics	
Description	Show or clear access management statistics.
Syntax	`security switch access statistics` **`[clear]`**
Parameters	**clear**: Clear access management statistics

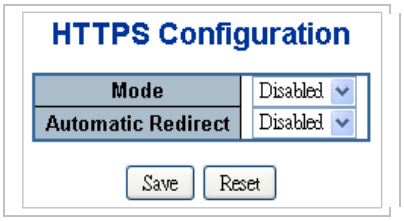
Example:

Show access management statistics.

```
SWITCH/>security switch access statistics

Access Management Statistics:
-----------------------------
HTTP     Receive:          79    Allow:          7    Discard:         72
HTTPS    Receive:           0    Allow:          0    Discard:          0
SNMP     Receive:           0    Allow:          0    Discard:          0
TELNET   Receive:           0    Allow:          0    Discard:          0
SSH      Receive:           0    Allow:          0    Discard:          0
```

4.11.4 HTTPs

Configure HTTPS



The page includes the following fields:

Object	Description
Mode	Indicates the HTTPS mode operation. Possible modes are: • **Enabled**: Enable HTTPS mode operation. • **Disabled**: Disable HTTPS mode operation.
Automatic Redirect	Indicates the HTTPS redirect mode operation. Automatic redirect web browser to HTTPS during HTTPS mode enabled. Possible modes are: • **Enabled**: Enable HTTPS redirect mode operation. • **Disabled**: Disable HTTPS redirect mode operation.

Console: Security Switch HTTPs Configuration	
Description	Show HTTPS configuration.
Syntax	`security switch https configuration`

Example:

Show HTTPs configuration.

```
SWITCH/>security switch https configuration

HTTPS Configuration:
====================

HTTPS Mode          : Disabled
HTTPS Redirect Mode : Disabled
```

Console: Security Switch HTTPs Mode	
Description	set or show the https mode.
Syntax	`security switch https mode` **`[enable|disable]`**
Parameters	**enable** : Enable HTTPs **disable**: Disable HTTPs (default: Show HTTPs mode)
Default Setting	disable

Example:

Enable HTTPs function.

```
SWITCH/>security switch https mode enable
```

Console: Security Switch HTTPs Redirect	
Description	Set or show the HTTPS redirect mode. Automatic redirect web browser to HTTPS during HTTPS mode enabled.
Syntax	`security switch https redirect` **`[enable|disable]`**
Parameters	**enable** : Enable HTTPs redirect **disable**: Disable HTTPs redirect (default: Show HTTPs redirect mode)
Default Setting	disable

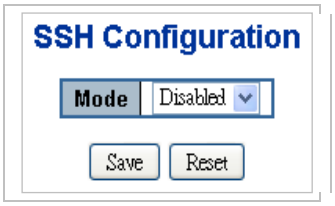
Example:

Enable HTTPs redirect function.

```
SWITCH/>security switch https redirect enable
```

4.11.5 SSH

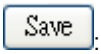
The status webpage is divided into two sections - one with a legend of user modules and one with the actual port status.



The page includes the following fields:

Object	Description
Mode	Indicates the SSH mode operation. Possible modes are: **Enabled**: Enable SSH mode operation. **Disabled**: Disable SSH mode operation.

Buttons



: Click to save changes.

Reset: Click to undo any changes made locally and revert to previously saved values.

Console: Security Switch SSH Configuration	
Description	Show SSH configuration.
Syntax	`security switch ssh configuration`

Example:

Show SSH configuration.

```
SWITCH/>security switch ssh configuration

SSH Configuration:
==================

SSH Mode : Disabled
```

Console: Security Switch SSH Mode	
Description	Set or show the SSH mode.
Syntax	`security switch ssh mode` **`[enable|disable]`**
Parameters	**enable** : Enable SSH **disable**: Disable SSH (default: Show SSH mode)
Default Setting	disable

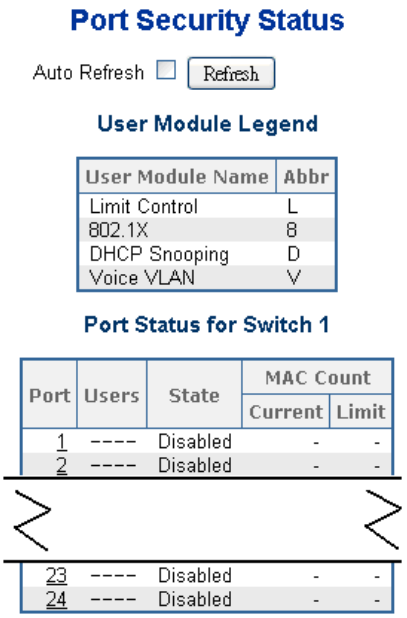
Example:

Enable SSH function.

```
SWITCH/>security switch ssh mode enable
```

4.11.6 Port Security Status

This webpage shows the Port Security status. The status page is divided into two sections - one with a legend of user modules and one with the actual port status.



The page includes the following fields:

- **User Module Legend**

The legend shows all user modules that may request Port Security services.

Object	Description
User Module Name	The full name of a module that may request Port Security services.
Abbr	A one-letter abbreviation of the user module. This is used in the Users column in the port status table.

- **Port Status**

The table has one row for each port on the selected switch in the switch and a number of columns, which are:

Object	Description
Port	The port number for which the status applies. Click the port number to see the status for this particular port.
Users	Displays whether a module has enabled Port Security or not. A '-' means that the corresponding user module is not enabled, whereas a letter indicates that the user module abbreviated by that letter (see Abbr) has enabled port security.
State	Shows the current state of the port. It can take one of four values: • **Disabled**: No user modules are currently using the Port Security service. • **Ready**: The Port Security service is in use by at least one user module, and is awaiting frames from unknown MAC addresses to arrive. • **Limit Reached**: The Port Security service is enabled by at least the Limit Control user module and no more MAC addresses should be taken in. • **Shutdown**: The Port Security service is enabled by at least the Limit Control user module. No MAC addresses can be learned on the port until it is administratively re-opened on the Limit Control configuration Web-page.
MAC Count (Current, Limit)	The two columns indicate the number of currently learned MAC addresses (forwarding as well as blocked) and the maximum number of MAC addresses that can be learned on the port, respectively. If no user modules are enabled on the port, the Current column will show a dash (-). If the Limit Control user module is not enabled on the port, the Limit column will show a dash (-).

Console: Security Network Psec Switch	
Description	Show Port Security status.
Syntax	`security network psec switch` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports
Default Setting	800007e5017f000001

Example:

Show port security status.

```
SWITCH/>security network psec switch
Users:
L = Limit Control
8 = 802.1X
D = DHCP Snooping
V = Voice VLAN

Port  Users   State             MAC Cnt
----  -----   -------------     -------
1     ----    No users                0
2     ----    No users                0
3     ----    No users                0
4     ----    No users                0
```

```
5     ----    No users                0
6     ----    No users                0
7     ----    No users                0
8     ----    No users                0
9     ----    No users                0
10    ----    No users                0
11    ----    No users                0
12    ----    No users                0
13    ----    No users                0
14    ----    No users                0
15    ----    No users                0
16    ----    No users                0
17    ----    No users                0
18    ----    No users                0
19    ----    No users                0
20    ----    No users                0
21    ----    No users                0
22    ----    No users                0
23    ----    No users                0
24    ----    No users                0
```

Console: Security Network Psec Port	
Description	Show MAC Addresses learned by Port Security.
Syntax	`security network psec port` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports

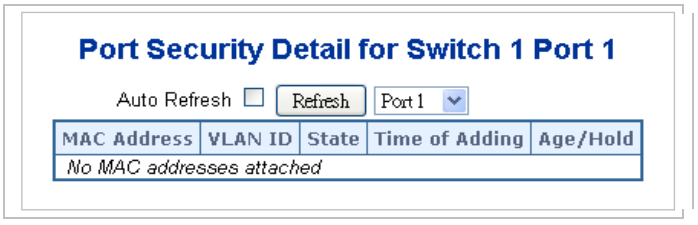
Example:

Show MAC address learned on port 1

```
SWITCH/>security network psec port 1

Port 1:
-------

MAC Address        VID   State       Added                    Age/Hold Time
-----------        ---   ----------  ---------------------    -------------
<none>
```

4.11.7 Port Security Detail

This page shows the MAC addresses secured by the Port Security module.



The page includes the following fields:

Object	Description
MAC Address & VLAN ID	The MAC address and VLAN ID that is seen on this port. If no MAC addresses are learned, a single row stating "No MAC addresses attached" is displayed.
State	Indicates whether the corresponding MAC address is blocked or forwarding. In the blocked state, it will not be allowed to transmit or receive traffic.
Time of Adding	Shows the date and time when this MAC address was first seen on the port.
Age/Hold	If at least one user module has blocked the MAC address, it will stay in the blocked state until the hold time expires. If all user modules have decided to allow this MAC address to forward, and aging is enabled, the Port Security module will

	periodically check that this MAC address still forwards traffic. If the age period expires and no frames have been seen, the MAC address will be removed from the MAC table. Otherwise the age counter will reset. If aging is disabled or a user module has decided to hold the MAC address indefinitely, a dash (-) will be shown.

4.11.8 DHCP Snooping

DHCP Snooping is used to block intruder on the untrusted ports of DUT when it tries to intervene by injecting a bogus DHCP reply packet to a legitimate conversation between the DHCP client and server. Configure DHCP Snooping on this page.

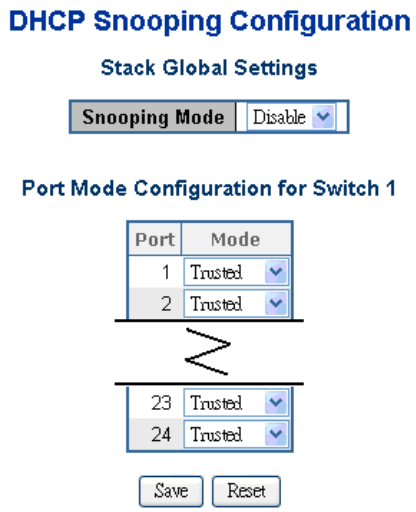


Figure 4-10 *- DHCP Snooping Configuration for the stack and for a particular switch*

The page includes the following fields:

Object	Description
Snooping Mode	Indicates the DHCP snooping mode operation. Possible modes are: • **Enabled**: Enable DHCP snooping mode operation. Requested DHCP messages will be forwarded to trusted ports and only allowed reply packets from trusted ports. • **Disabled**: Disable DHCP snooping mode operation.
Port Mode	Indicates the DHCP snooping port mode. Possible port modes are: • **Trusted**: Configures the port as trusted sources of the DHCP message. • **Untrusted**: Configures the port as untrusted sources of the DHCP message.

Console: Security Network DHCP Snooping Configuration	
Description	Show DHCP snooping configuration.
Syntax	`security network dhcp snooping configuration`

Example:

```
SWITCH/>security network dhcp snooping configuration

DHCP Snooping Configuration:
============================

DHCP Snooping Mode : Disabled
```

```
Port  Port Mode
----  -----------
1     trusted
2     trusted
3     trusted
4     trusted
5     trusted
6     trusted
7     trusted
8     trusted
9     trusted
10    trusted
11    trusted
12    trusted
13    trusted
14    trusted
15    trusted
16    trusted
17    trusted
18    trusted
19    trusted
20    trusted
21    trusted
22    trusted
23    trusted
24    trusted
```

Console: Security Network DHCP Snooping Mode	
Description	Set or show the DHCP snooping mode.
Syntax	`security network dhcp snooping mode` **`[enable|disable]`**
Parameters	**enable** : Enable DHCP snooping mode. When DHCP snooping mode operation is enabled, the requested DHCP messages will be forwarded to trusted ports and only allowed reply to packets from trusted ports. **disable**: Disable DHCP snooping mode (default: Show flow DHCP snooping mode)
Default Setting	disable

Example:

Enable DHCP snooping mode

```
SWITCH/>security network dhcp snooping mode enable
```

Console: Security Network DHCP Snooping Configuration	
Description	Set or show the DHCP snooping port mode.
Syntax	`security network dhcp snooping port mode` ***[<port_list>]*** **`[trusted|untrusted]`**
Parameters	***<port_list>***: Port list or 'all', default: All ports **trusted** : Configures the port as trusted sources of the DHCP message **untrusted**: Configures the port as untrusted sources of the DHCP message (default: Show flow DHCP snooping port mode)
Default Setting	trusted

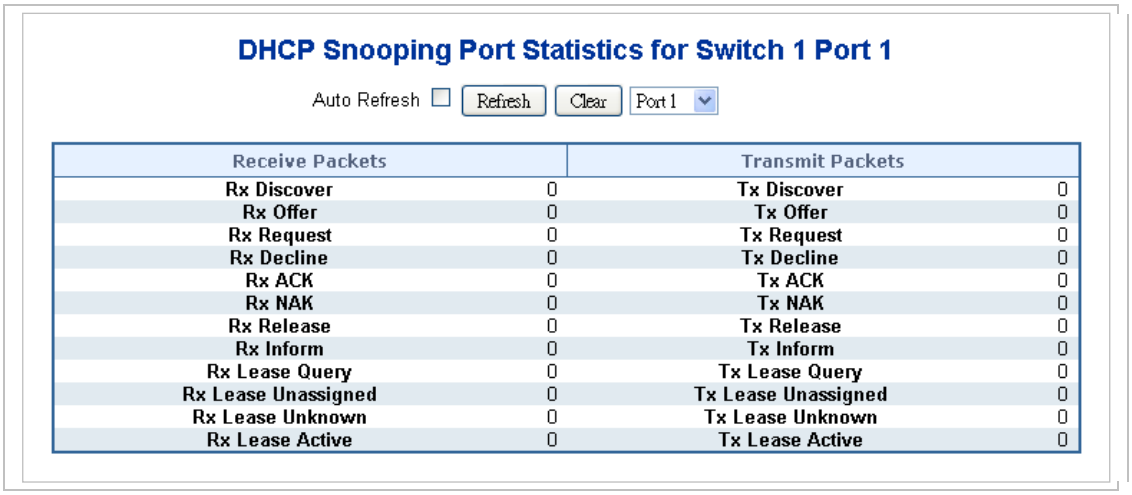
Example:

Set untrusted DHCP snooping port mode in port 1

```
SWITCH/>security network dhcp snooping port mode 1 untrusted
```

4.11.9 DHCP Snooping Statistics

This page provides port statistics for DHCP snooping. The statistics only count packets for which DHCP snooping mode is enabled and relay mode is disabled. DHCP packets for system DHCP client are not counted.



The page includes the following fields:

Object	Description
Rx and Tx Discover	The number of discover (option 53 with value 1) packets received and transmitted.
Rx and Tx Offer	The number of offer (option 53 with value 2) packets received and transmitted.
Rx and Tx Request	The number of request (option 53 with value 3) packets received and transmitted.
Rx and Tx Decline	The number of decline (option 53 with value 4) packets received and transmitted.
Rx and Tx ACK	The number of ACK (option 53 with value 5) packets received and transmitted.
Rx and Tx NAK	The number of NAK (option 53 with value 6) packets received and transmitted.
Rx and Tx Release	The number of release (option 53 with value 7) packets received and transmitted.
Rx and Tx Inform	The number of inform (option 53 with value 8) packets received and transmitted.
Rx and Tx Lease Query	The number of lease query (option 53 with value 10) packets received and transmitted.
Rx and Tx Lease Unassigned	The number of lease unassigned (option 53 with value 11) packets received and transmitted.
Rx and Tx Lease Unknown	The number of lease unknown (option 53 with value 12) packets received and transmitted.
Rx and Tx Lease Active	The number of lease active (option 53 with value 13) packets received and transmitted.

Buttons

Clear: Clears the counters for the selected port.

Console: Security Network DHCP Snooping Statistics	
Description	Show or clear dhcp snooping statistics.
Syntax	`security network dhcp snooping statistics` ***`[<port_list>]`*** **`[clear]`**
Parameters	***<port_list>***: Port list or 'all', default: All ports **clear**: Clear DHCP snooping statistics

Example:

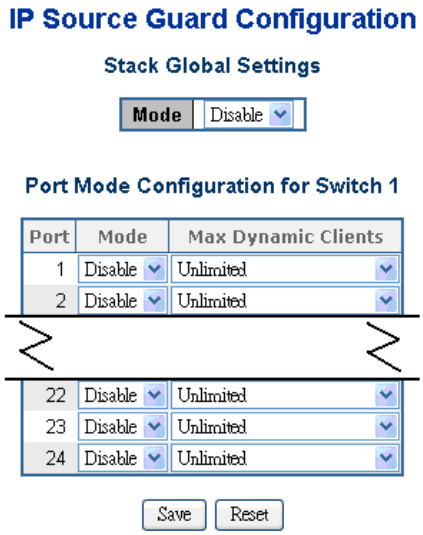
Show DHCP snooping statistics of port 1.

```
SWITCH/>security network dhcp snooping statistics 1
Port 1 Statistics:
--------------------
```

```
Rx Discover:                    0   Tx Discover:                    0
Rx Offer:                       0   Tx Offer:                       0
Rx Request:                     0   Tx Request:                     0
Rx Decline:                     0   Tx Decline:                     0
Rx ACK:                         0   Tx ACK:                         0
Rx NAK:                         0   Tx NAK:                         0
Rx Release:                     0   Tx Release:                     0
Rx Inform:                      0   Tx Inform:                      0
Rx Lease Query:                 0   Tx Lease Query:                 0
Rx Lease Unassigned:            0   Tx Lease Unassigned:            0
Rx Lease Unknown:               0   Tx Lease Unknown:               0
Rx Lease Active:                0   Tx Lease Active:                0
```

4.11.10 IP Source Guard Configuration

IP Source Guard is a secure feature used to restrict IP traffic on DHCP snooping untrusted ports by filtering traffic based on the DHCP Snooping Table or manually configured IP Source Bindings, preventing IP spoofing attacks. This page provides IP Source Guard related configuration.



The page includes the following fields:

Object	Description
Mode of IP Source Guard Configuration	Enable the Global IP Source Guard or disable the Global IP Source Guard. All configured ACEs will be lost when the mode is enabled.
Port Mode Configuration	Specify IP Source Guard is enabled on which ports. Only when both Global Mode and Port Mode on a given port are enabled, IP Source Guard is enabled on this given port.
Max Dynamic Clients	Specify the maximum number of dynamic clients can be learned on given ports. This value can be ***0***, ***1***, ***2*** and ***unlimited***. If the port mode is enabled and the value of max dynamic client is equal 0, it means only allow the IP packets forwarding that are matched in static entries on the specific port.

Console: Security Network IP Source Guard Configuration	
Description	Show IP source guard configuration.
Syntax	`security network ip source guard configuration`

Example:

Show IP source guard configuration.

```
SWITCH/>security network ip source guard configuration

IP Source guard Configuration:
==============================

IP Source Guard Mode : Disabled

Port  Port Mode    Dynamic Entry Limit
----  ----------  --------------------
1     Disabled    unlimited
2     Disabled    unlimited
3     Disabled    unlimited
4     Disabled    unlimited
5     Disabled    unlimited
6     Disabled    unlimited
7     Disabled    unlimited
8     Disabled    unlimited
9     Disabled    unlimited
10    Disabled    unlimited
11    Disabled    unlimited
12    Disabled    unlimited
13    Disabled    unlimited
14    Disabled    unlimited
15    Disabled    unlimited
16    Disabled    unlimited
17    Disabled    unlimited
18    Disabled    unlimited
19    Disabled    unlimited
20    Disabled    unlimited
21    Disabled    unlimited
22    Disabled    unlimited
23    Disabled    unlimited
24    Disabled    unlimited

IP Source Guard Entry Table:

Type    Port  VLAN  IP Address       IP Mask
-----   ----  ----  ---------------  ---------------
```

Console: Security Network IP Source Guard Mode	
Description	Set or show IP source guard mode.
Syntax	`security network ip source guard mode` **`[enable|disable]`**
Parameters	**enable**: Enable IP Source Guard **disable**: Disable IP Source Guard
Default Setting	disable

Example:

Enable IP source guard mode

```
SWITCH/>security network ip source guard mode enable
```

Console: Security Network IP Source Guard Limit	
Description	Set or show the IP Source Guard port limitation for dynamic entries..
Syntax	`security network ip source guard limit` ***[<port_list>]*** ***[<dynamic_entry_limit>***`|unlimited]`
Parameters	**<port_list>**: Port list or 'all', default: All ports **<dynamic_entry_limit>|unlimited**: dynamic entry limit (0-2) or unlimited

Example:

Set IP source guard limit

```
SWITCH/>security network ip source guard 1 1
```

Console: Security Network IP Source Guard Port Mode	
Description	Set or show the IP Source Guard port mode.
Syntax	`security network ip source guard port mode` ***[<port_list>]*** **[enable|disable]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable IP Source Guard port **disable**: Disable IP Source Guard port (default: Show IP Source Guard port mode)
Default Setting	disable

Example:

Enable IP source guard port mode for port1~4

```
SWITCH/>security network ip source guard port mode 1-4 enable
```

4.11.11 IP Source Guard Static Table

This page provides Static IP Source Guard Table.

The page includes the following fields:

Object	Description
Delete	Check to delete the entry. It will be deleted during the next save.
Port	The logical port for the settings.
VLAN ID	The VLAN ID for the settings.
IP Address	Allowed Source IP address.
IP Mask	Used for calculating the allowed network with IP address.

Buttons

Add new entry: Click to add a new entry.

Console: Security Network IP Source Guard Entry	
Description	Add or delete IP source guard static entry.
Syntax	`security network ip source guard entry` ***[<port_list>]*** **add|delete** ***<vid> <allowed_ip> <ip_mask>***
Parameters	***<port_list>***: Port list or 'all', default: All ports **add**: Add new port IP source guard static entry **delete**: Delete existing port IP source guard static entry **<vid>**: VLAN ID (1-4095) **<allowed_ip>**: IP address (a.b.c.d), IP address allowed for doing ARP request **<ip_mask>**: IP mask (a.b.c.d), IP mask for allowed IP address
Default Setting	unlimited

Example:

Add IP source guard static entry.

```
SWITCH/>security network ip source guard entry 1 add 1 192.168.0.20 255.255.255.0
```

Console: Security Network IP Source Guard Status	
Description	Show IP source guard static and dynamic entries.
Syntax	`security network ip source guard status` ***[<port_list>]***
Parameters	**<port_list>**: Port list or 'all', default: All ports

Example:

Show IP source guard static and dynamic entries.

```
SWITCH/>security network ip source guard status
```

4.11.12 ARP Inspection

ARP Inspection is a secure feature. . This feature is used to block attacks launched against a host or devices connected to Layer 2 networks by "poisoning" the ARP caches. Only valid ARP requests and responses can go through DUT. This page provides ARP Inspection related configuration.

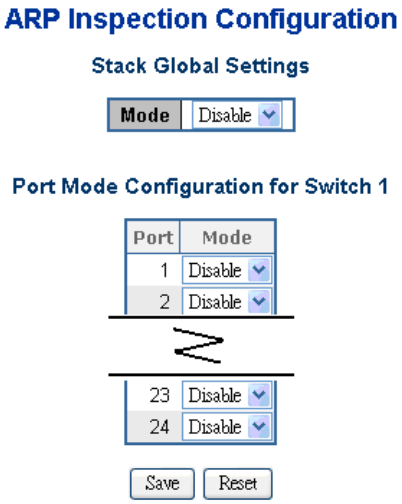


Figure4-11 *- ARP Inspection Configuration for the stack and for a particular switch*

The page includes the following fields:

Object	Description
Mode of ARP Inspection Configuration	**Enable** or **Disable** Global ARP Inspection
Port Mode Configuration	Specify ARP Inspection is enabled on which ports. Only when both Global Mode and Port Mode on a given port are enabled, ARP Inspection is enabled on this given port.

Console: Security Network ARP Inspection Configuration	
Description	Show ARP inspection configuration.

Syntax	`security network arp inspection configuration`

Example:

Show ARP inspection configuration.

```
SWITCH/>security network arp inspection configuration
```

Console: Security Network ARP Inspection Mode	
Description	Set or show ARP inspection mode.
Syntax	`security network arp inspection mode` **`[enable|disable]`**
Parameters	**enable**: Enable ARP Inspection **disable**: Disable ARP Inspection
Default Setting	disable

Example:

Enable ARP inspection mode

```
SWITCH/>security network arp inspection mode enable
```

Console: Security Network ARP Inspection Port Mode	
Description	Set or show the ARP Inspection port mode.
Syntax	`security network arp inspection port mode` ***`[<port_list>]`*** **`[enable|disable]`**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable ARP Inspection port **disable**: Disable ARP Inspection port (default: Show ARP Inspection port mode)
Default Setting	disable

Example:

Enable the ARP inspection mode of port 1

```
SWITCH/>security network arp inspection port mode 1
```

4.11.13 ARP Inspection Static Table

This page provides Static ARP Inspection Table for a single switch.

The page includes the following fields:

Object	Description
Delete	Check to delete the entry. It will be deleted during the next save.
Port	The logical port for the settings.

VLAN ID	The VLAN ID for the settings.
MAC Address	Allowed Source MAC address in ARP request packets.
IP Address	Allowed Source IP address in ARP request packets.

Buttons

: Click to add a new entry.

Console: Security Network ARP Inspection Entry	
Description	Add or delete ARP inspection static entry.
Syntax	`security network arp inspection entry` ***[<port_list>]*** **add|delete** ***<vid> <allowed_mac> <allowed_ip>***
Parameters	***<port_list>***: Port list or 'all', default: All ports **add**: Add new port ARP inspection static entry **delete**: Delete existing port ARP inspection static entry ***<vid>***: VLAN ID (1-4095) ***<allowed_mac>***: MAC address (xx-xx-xx-xx-xx-xx), MAC address allowed for doing ARP request ***<allowed_ip>***: IP address (a.b.c.d), IP address allowed for doing ARP request
Default Setting	300

Example:

Add ARP inspection static entry.

```
SWITCH/>security network arp inspection entry 1 add 1 00-30-4f-00-00-11
192.168.0.11
```

Console: Security Network ARP Inspection Status	
Description	Show ARP inspection static and dynamic entries.
Syntax	`security network arp inspection status` ***[<port_list>]***
Parameters	**<port_list>**: Port list or 'all', default: All ports
Default Setting	300

Example:

Show ARP inspection static and dynamic entries.

```
SWITCH/>security network arp inspection status
```

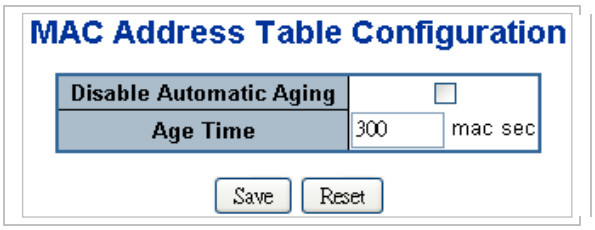
4.12 Address Table

The Managed Switch builds up a table that maps MAC addresses to switch ports for knowing which ports the frames should go to (based upon the DMAC address in the frame). This table contains both static and dynamic entries. The static entries are configured by the network administrator if the administrator wants to do a fixed mapping between the DMAC address and switch ports.

The frames also contain a MAC address (SMAC address), which shows the MAC address of the equipment sending the frame. The SMAC address is used by the switch to automatically update the MAC table with these dynamic MAC addresses. Dynamic entries are removed from the MAC table if no frame with the corresponding SMAC address has been seen after a configurable age time.

4.12.1 MAC Address Table Configuration

The MAC Address Table is configured on this page. Set timeouts for entries in the dynamic MAC Table and configure the static MAC table here.



The page includes the following fields:

Object	Description
Disable Automatic Aging	Enables/disables the automatic aging of dynamic entries
Aging Time	The time after which a learned entry is discarded. By default, dynamic entries are removed from the MAC after 300 seconds. This removal is also called aging. (Range: ***10***-***10000000*** seconds; Default: ***300*** seconds)

Console: MAC Configuration	
Description	Show MAC address table configuration.
Syntax	`mac configuration` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports

Example:

Show Mac address state

```
SWITCH/>mac configuration

MAC Configuration:
==================

MAC Address:  00-30-4f-24-04-d1
MAC Age Time: 300

Port  Learning
----  --------
1     Auto
2     Auto
3     Auto
4     Auto
5     Auto
6     Auto
7     Auto
8     Auto
9     Auto
10    Auto
11    Auto
12    Auto
13    Auto
14    Auto
15    Auto
16    Auto
17    Auto
18    Auto
19    Auto
20    Auto
```

```
21    Auto
22    Auto
23    Auto
24    Auto
```

Console: MAC Age Time	
Description	Set or show the MAC address age timer.
Syntax	`mac agetime` ***[<age_time>]***
Parameters	***<age_time>***: MAC address age time (0,10-1000000) 0=disable, (default: Show age time)
Default Setting	300

Example:

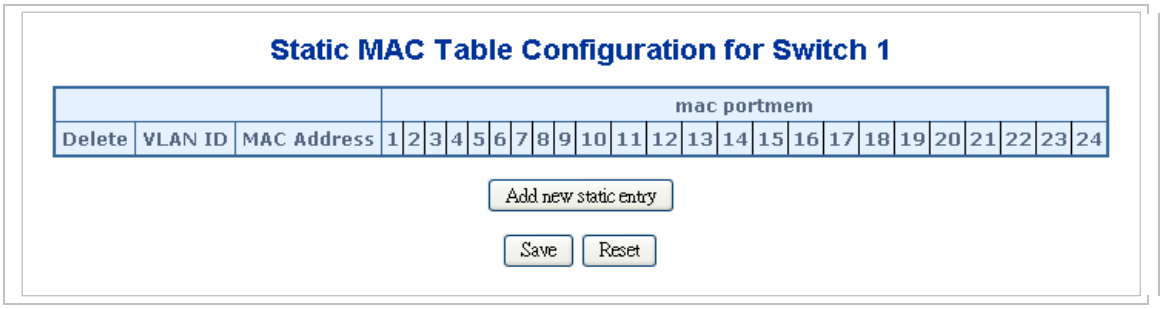
Set agetime value in 30

```
SWITCH/>mac agetime 30
```

4.12.2 Static MAC Table Configuration

The static entries in the MAC table are shown in this table.

The static MAC table can contain 64 entries. The maximum of 64 entries is for the whole stack, and not per switch. The MAC table is sorted first by VLAN ID and then by MAC address.


Static MAC Table Configuration for Switch 1
mac portmem
Delete
VLAN ID
MAC Address
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Add new static entry
Save
Reset

The page includes the following fields:

Object	Description
Delete	Check to delete the entry. It will be deleted during the next save.
VLAN ID	The VLAN ID for the entry.
MAC Address	The MAC address for the entry.
Port Members	Checkmarks indicate which ports are members of the entry. Check or uncheck as needed to modify the entry.

Buttons

: Click to add new entry.

Console: MAC Add	
Description	Add MAC address table entry.

Syntax	`mac add` ***<mac_addr> <port_list> [<vid>]***
Parameters	***<mac_addr>***: MAC address (xx-xx-xx-xx-xx-xx) ***<port_list>***: Port list or 'all' or 'none' ***<vid>***: VLAN ID (1-4095), default: 1

Example:

Add Mac address 00-30-4F-01-01-02 in port1 and vid1

```
SWITCH/>mac add 00-30-4f-01-01-02 1 1
```

Console: MAC Delete	
Description	Delete MAC address entry.
Syntax	`mac delete` ***<mac_addr> [<vid>]***
Parameters	***<mac_addr>***: MAC address (xx-xx-xx-xx-xx-xx) ***<vid>***: VLAN ID (1-4095), default: 1

Example:

Delete Mac address 00-30-4F-01-01-02 in vid1

```
SWITCH/>mac delete 00-30-4f-01-01-02 1
```

Console: MAC Lookup	
Description	Lookup MAC address entry.
Syntax	`mac lookup` ***<mac_addr> [<vid>]***
Parameters	***<mac_addr>***: MAC address (xx-xx-xx-xx-xx-xx) ***<vid>***: VLAN ID (1-4095), default: 1

Example:

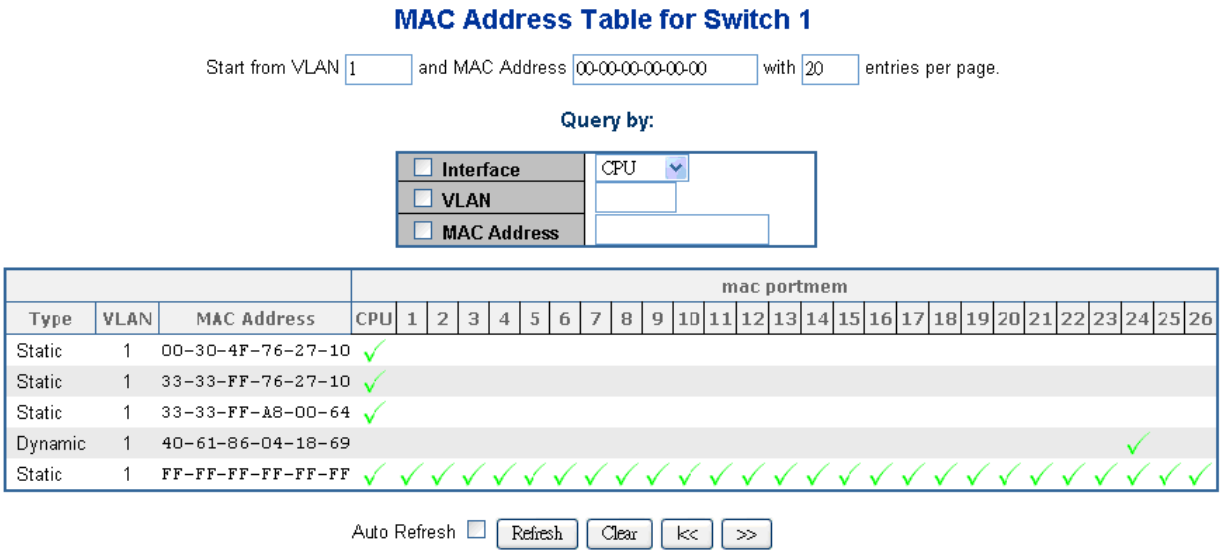
Lookup state of Mac address 00-30-4F-01-01-02

```
SWITCH/>mac lookup 00-30-4f-01-01-02
```

4.12.3 MAC Address Table Status

Dynamic MAC Table

The MAC Table for the switch contains up to 8192 entries, and is sorted first by VLAN ID, then by MAC address.


MAC Address Table for Switch 1
Start from VLAN 1 and MAC Address 00-00-00-00-00-00 with 20 entries per page.
Query by:
Interface
CPU
VLAN
MAC Address
mac portmem
Type VLAN MAC Address CPU 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
Static 1 00-30-4F-76-27-10
Static 1 33-33-FF-76-27-10
Static 1 33-33-FF-A8-00-64
Dynamic 1 40-61-86-04-18-69
Static 1 FF-FF-FF-FF-FF-FF
Auto Refresh
Refresh
Clear
<<
>>

Navigating the MAC Table

Each page shows up to 999 entries from the MAC table, default being 20, selected through the "entries per page" input field. When first visited, the web page will show the first 20 entries from the beginning of the MAC Table. The first displayed will be the one with the lowest VLAN ID and the lowest MAC address found in the MAC Table.

The "**Start from MAC address**" and "**VLAN**" input fields allow the user to select the starting point in the MAC Table.

The page includes the following fields:

Object	Description
Query by:	The query of the MAC addresses entry. The following query types are supported: • **Interface**: Query of the MAC addresses entry by interface. • **VLAN**: Query of the MAC addresses entry by VLAN. • **MAC Address**: Query of the MAC addresses entry by MAC address.
Type	Indicates whether the entry is a static or dynamic entry.
VLAN	The VLAN ID of the entry.
MAC address	The MAC address of the entry.
Port Members	The ports that are members of the entry.

Buttons

Refresh: Refreshes the displayed table starting from the "Start from MAC address" and "VLAN" input fields.

Clear: Flushes all dynamic entries.

<<: Updates the table starting from the first entry in the MAC Table, i.e. the entry with the lowest VLAN ID and MAC address.

>>: Updates the table, starting with the entry after the last entry currently displayed.

Console: MAC Dump	
Description	Show sorted list of MAC address entries.
Syntax	`mac dump` ***[<mac_max>] [<mac_addr>] [<vid>]***
Parameters	***<mac_max>***: Maximum number of MAC addresses 1-8192, default: Show all addresses ***<mac_addr>***: First MAC address (xx-xx-xx-xx-xx-xx), default: MAC address zero ***<vid>***: First VLAN ID (1-4095), default: 1

Example:

Show all of MAC table

```
SWITCH/>mac dump
Type    VID   MAC Address        Ports
------  ---   -----------------  -----
Static    1   00-30-00-33-22-55    1
Static    1   00-30-4f-24-04-d1    None,CPU
Static    1   33-33-ff-24-04-d1    None,CPU
Static    1   33-33-ff-a8-00-64    None,CPU
Dynamic   1   40-61-86-04-18-69    10
Static    1   ff-ff-ff-ff-ff-ff    1-24,CPU
```

Console: MAC Statistics	
Description	Show MAC address table statistics.
Syntax	`mac statistics` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', (default: All ports)

Example:

Set all of MAC statistics

```
SWITCH/>mac statistics
Port  Dynamic Addresses
----  -----------------
1     0
2     0
3     0
4     0
5     0
6     0
7     0
8     0
9     0
10    1
11    0
12    0
13    0
14    0
15    0
16    0
17    0
18    0
19    0
20    0
21    0
22    0
23    0
24    0

Total Dynamic Addresses: 1
Total Static Addresses : 5
```

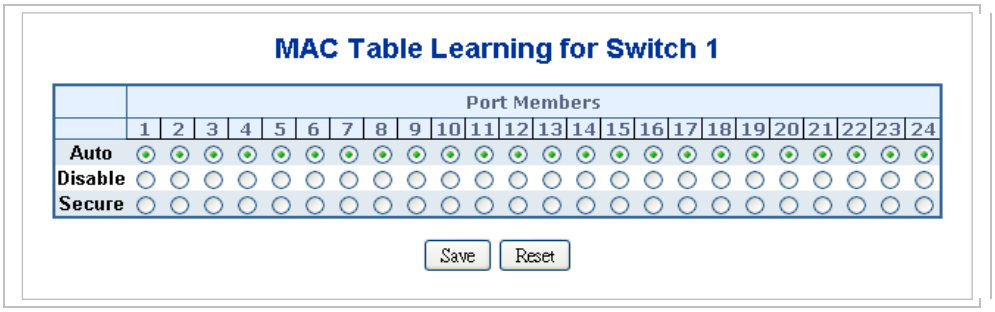
Console: MAC Flush	
Description	Flush all learned entries.
Syntax	`mac flush`

4.12.4 MAC Table Learning

If the learning mode for a given port is greyed out, another module is in control of the mode, so that it cannot be changed by the user.

When port security is enabled on a port, the Managed Switch, a configured maximum number of MAC addresses are learned on a specified port. Only incoming traffic with source addresses already stored in the dynamic or static address table will be authorized to access the network through that port. If a device with an unauthorized MAC address attempts to use the switch port, the intrusion will be detected and the switch can automatically take action by disabling the port and sending a trap message.

Note that you can also manually add secure addresses to the port using the Static Address Table. The selected port will stop learning. The MAC addresses already in the address table will be retained and will not age out.


MAC Table Learning for Switch 1
Port Members
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Auto
Disable
Secure
Save
Reset

The page includes the following fields:

Object	Description
Auto	Learning is done automatically as soon as a frame with unknown SMAC is received.
Disable	No learning is done.
Secure	Only static MAC entries are learned, all other frames are dropped.

Make sure that the link used for managing the switch is added to the Static Mac Table before changing to secure learning mode, otherwise the management link is lost and can only be restored by using another non-secure port or by connecting to the switch via the serial interface.

Console: MAC Learning	
Description	Set or show the port learn mode.
Syntax	`mac learning` ***[<port_list>]*** **`[auto|disable|secure]`**
Parameters	***<port_list>***: Port list or 'all', default: All ports **auto** : Automatic learning **disable**: Disable learning **secure** : Secure learning (default: Show learn mode)
Default Setting	Auto

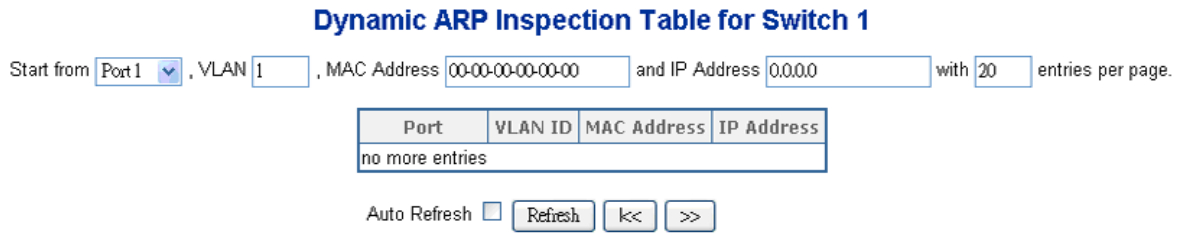
Example:

Set secure learning mode in port1

```
SWITCH/>mac learning 1 secure
```

4.12.5 Dynamic ARP Inspection Table

Entries in the Dynamic ARP Inspection Table are shown on this page. The Dynamic ARP Inspection Table contains up to 1024 entries, and is sorted first by port, then by VLAN ID, then by MAC address, and then by IP address.


Dynamic ARP Inspection Table for Switch 1
Start from Port 1 , VLAN 1 , MAC Address 00-00-00-00-00-00 and IP Address 0.0.0.0 with 20 entries per page.
Port
VLAN ID
MAC Address
IP Address
no more entries
Auto Refresh
Refresh
<<
>>

Navigating the ARP Inspection Table

Each page shows up to 999 entries from the Dynamic ARP Inspection table, default being 20, selected through the "**entries per page**" input field. When first visited, the web page will show the first 20 entries from the beginning of the Dynamic ARP Inspection Table.

The "Start from port address", "VLAN", "MAC address" and "IP address" input fields allow the user to select the starting point in the Dynamic ARP Inspection Table.

The page includes the following fields:

Object	Description
Port	The port number for which the status applies. Click the port number to see the status for this particular port.
VLAN ID	The VLAN ID of the entry.
MAC address	The MAC address of the entry.
IP Address	The IP address of the entry.

Buttons

Refresh: Refreshes the displayed table starting from the "Start from MAC address" and "VLAN" input fields.

Clear: Flushes all dynamic entries.

<<: Updates the table starting from the first entry in the MAC Table, i.e. the entry with the lowest VLAN ID and MAC address.

>>: Updates the table, starting with the entry after the last entry currently displayed.

4.12.6 Dynamic IP Source Guard Table

The Dynamic IP Source Guard Table is sorted first by port, then by VLAN ID, then by IP address, and then by IP mask.

Dynamic IP Source Guard Table for Switch 1
Start from Port 1 , VLAN 1 and IP Address 0.0.0.0 and IP Mask 0.0.0.0 with 20 entries per page.
Port
VLAN ID
IP Address
IP Mask
no more entries
Auto Refresh
Refresh
<<
>>

Navigating the ARP Inspection Table

Each page shows up to 999 entries from the Dynamic IP Source Guard table, default being 20, selected through the "**entries per page**" input field. When first visited, the web page will show the first 20 entries from the beginning of the Dynamic IP Source Guard Table. The "**Start from port address**", "**VLAN**", "**IP address**" and "**IP mask**" input fields allow the user to select the starting point in the Dynamic IP Source Guard Table.

The page includes the following fields:

Object	Description
Port	The port number for which the status applies. Click the port number to see the status for this particular port.
VLAN ID	The VLAN ID of the entry.
MAC address	The MAC address of the entry.
IP Address	The IP address of the entry.

Buttons

Refresh: Refreshes the displayed table starting from the "Start from MAC address" and "VLAN" input fields.

Clear: Flushes all dynamic entries.

<<: Updates the table starting from the first entry in the MAC Table, i.e. the entry with the lowest VLAN ID and MAC address.

>>: Updates the table, starting with the entry after the last entry currently displayed.

4.13 LLDP

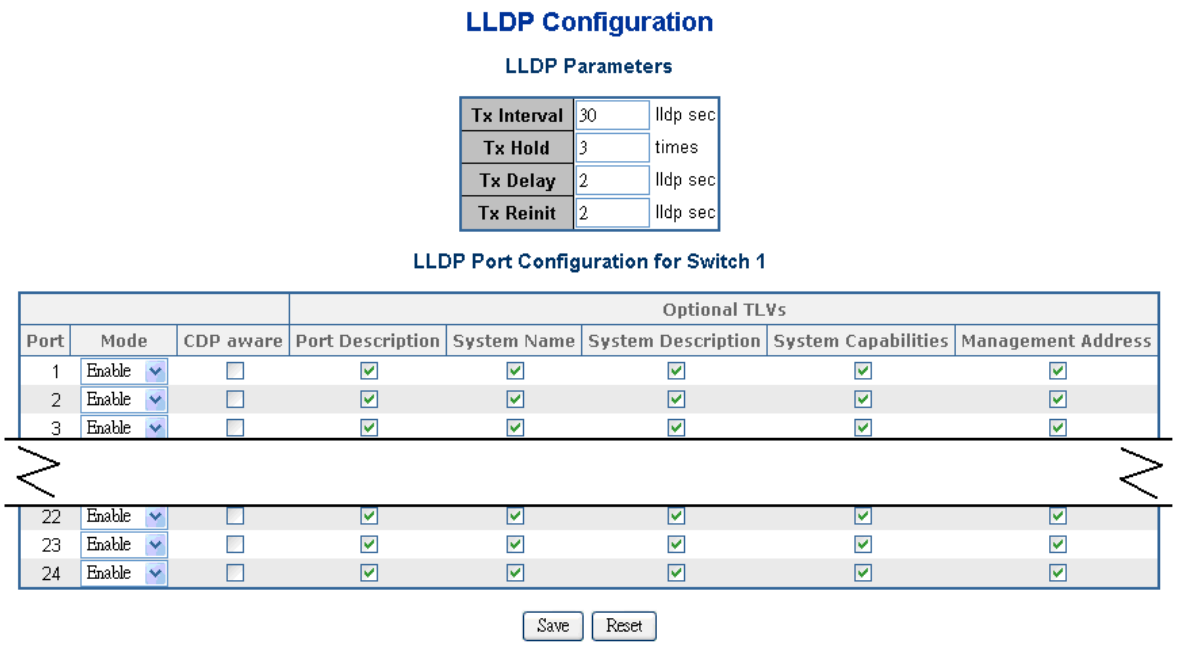
4.13.1 Link Layer Discovery Protocol

Link Layer Discovery Protocol (LLDP) is used to discover basic information about neighbouring devices on the local broadcast domain. LLDP is a Layer 2 protocol that uses periodic broadcasts to advertise information about the sending device.

Link Layer Discovery Protocol - Media Endpoint Discovery (LLDP-MED) is an extension of LLDP intended for managing endpoint devices such as Voice over IP phones and network switches. The LLDP-MED TLVs advertise information such as network policy, power, inventory, and device location details.

4.13.2 LLDP Configuration

Configure the current LLDP port settings.



The page includes the following fields:

➢ **LLDP Parameters**

Object	Description
Tx Interval	The interval between each LLDP frame is determined by the Tx Interval value. Valid values are restricted to ***5*** - ***32768*** seconds. Default: 30 seconds
Tx Hold	Each LLDP frame contains information about how long the information is valid. The LLDP information valid period is set to Tx Hold multiplied by Tx Interval seconds. Valid values are restricted to ***2*** - ***10*** times.
Tx Delay	If some configuration is changed (e.g. the IP address) a new LLDP frame is transmitted, but the time between the LLDP frames will always be at least the value of Tx Delay seconds. Tx Delay cannot be larger than 1/4 of the Tx Interval value. Valid values are restricted to ***1*** - ***8192*** seconds.

Tx Reinit	When a port is disabled, LLDP is disabled or the switch is rebooted a LLDP shutdown frame is transmitted to the neighbouring units, signalling that the LLDP information isn't valid anymore. Tx Reinit controls the amount of seconds between the shutdown frame and a new LLDP initialization. Valid values are restricted to ***1*** - ***10*** seconds.

- **LLDP Port Configuration**

The LLDP port settings relate to the currently selected stack unit.

Object	Description
Port	The switch port number of the logical LLDP port.
Mode	Select LLDP mode. • **Rx only**: The switch will not send out LLDP information, but LLDP information from neighbour units is analyzed. • **Tx only**: The switch will drop LLDP information received from neighbours, but will send out LLDP information. • **Disabled**: The switch will not send out LLDP information, and will drop LLDP information received from neighbours. • **Enabled**: The switch will send out LLDP information, and will analyze LLDP information received from neighbours.
CDP Aware	Select CDP awareness. • The CDP operation is restricted to decoding incoming CDP frames. CDP frames are only decoded if LLDP for the port is enabled. • Only CDP TLVs that can be mapped into a corresponding field in the LLDP neighbours table are decoded. All other TLVs are discarded CDP. TLVs are mapped into LLDP neighbours table as shown below. • CDP TLV "Device ID" is mapped into the LLDP "Chassis ID" field. • CDP TLV "Address" is mapped into the LLDP "Management Address" field. The CDP address TLV can contain multiple addresses, but only the first address is shown in the LLDP neighbours table. • CDP TLV "Port ID" is mapped into the LLDP "Port ID" field. • CDP TLV "Version and Platform" is mapped into the LLDP "System Description" field. Both the CDP and LLDP supports "system capabilities", but the CDP capabilities cover capabilities that are not part of the LLDP. These capabilities are shown as "others" in the LLDP neighbours table. If all ports have CDP awareness disabled the switch forwards CDP frames received from neighbour devices. If at least one port has CDP awareness enabled all CDP frames are terminated by the switch. **Note:** When CDP awareness for a port is disabled the CDP information isn't removed immediately, but will be removed when the hold time is exceeded.
Port Descr	Check to include "port description" in LLDP transmission
Sys Name	Check to include "system name" in LLDP transmission
Sys Descr	Check to include "system description" in LLDP transmission
Sys Capa	Check to include "system capability in LLDP transmission This identifies the primary function(s) of the system and whether or not they are enabled.
Mgmt Addr	Check to include "management address" in LLDP information transmitted. The management address protocol packet includes the IPv4 address of the switch. If no management address is available, the address should be the MAC address for the CPU or for the port sending this advertisement.

Console: LLDP Configuration	
Description	Show LLDP configuration.
Syntax	`lldp configuration` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports

Example:

Show LLDP configuration of port1~4

```
SWITCH/>lldp configuration 1-4

LLDP Configuration:
===================

Interval    : 30
Hold        : 3
Tx Delay    : 2
Reinit Delay: 2

Port  Mode     Port Descr System Name System Descr System Capa Mgmt Addr CDP awareness
----  -----    ---------  ----------- ------------ ----------- --------- ------------
1     Enabled  Enabled    Enabled      Enabled      Enabled     Enabled   Disabled
2     Enabled  Enabled    Enabled      Enabled      Enabled     Enabled   Disabled
3     Enabled  Enabled    Enabled      Enabled      Enabled     Enabled   Disabled
4     Enabled  Enabled    Enabled      Enabled      Enabled     Enabled   Disabled
```

Console: LLDP Mode	
Description	Set or show LLDP mode.
Syntax	`lldp mode` ***[<port_list>]*** **[enable|disable|rx|tx]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable LLDP reception and transmission **disable**: Disable LLDP **rx**: Enable LLDP reception only **tx**: Enable LLDP transmission only (default: Show LLDP mode)
Default Setting	disable

Example:

Enable port1 LLDP function.

```
SWITCH/>lldp mode 1 enable
```

Console: LLDP Optional TLV	
Description	Show or Set LLDP Optional TLVs.
Syntax	`lldp optional_tlv` ***[<port_list>]*** ***[<port_descr>|<sys_name>|<sys_descr>|<sys_capa>|<mgmt_addr>]*** **[enable|disable]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **port_descr**: Description of the port **sysm_name**: System name **sys_descr**: Description of the system **sys_capa**: System capabilities **mgmt_addr**: Master's IP address (default: Show optional TLV's configuration) **enable**: Enables TLV **disable**: Disable TLV (default: Show optional TLV's configuration)
Default Setting	All enabled

Example:

Disable description of the port for port1

```
SWITCH/>lldp optional_tlv 1 port_descr disable
```

Console: LLDP Interval	
Description	Set or show LLDP Tx interval.
Syntax	`lldp interval` ***[<interval>]***
Parameters	***<interval>***: LLDP transmission interval (5-32768)
Default Setting	30

Example:

Set transmission interval in 10

```
SWITCH/>lldp interval 10
```

Console: LLDP Hold	
Description	Set or show LLDP Tx hold value.
Syntax	`lldp hold` ***[<hold>]***
Parameters	***<hold>***: LLDP hold value (2-10)
Default Setting	3

Example:

Set LLDP hold value in 10

```
SWITCH/>lldp hold 10
```

Console: LLDP Delay	
Description	Set or show LLDP Tx delay.
Syntax	`lldp delay` ***[<delay>]***
Parameters	***<delay>***: LLDP transmission delay (1-8192)
Default Setting	2

Example:

Set LLDP delay value in 1

```
SWITCH/>lldp delay 1
```

Console: LLDP Reinit	
Description	Set or show LLDP reinit delay.
Syntax	`LLDP Reinit` ***[<reinit>]***
Parameters	***<reinit>***: LLDP reinit delay (1-10)
Default Setting	2

Example:

Set LLDP reinit delay value in 3

```
SWITCH/>lldp reinit 3
```

Console: LLDP CDP Aware	
Description	Set or show if discovery information from received CDP (Cisco Discovery Protocol) frames is added to the LLDP neighbour table.
Syntax	`lldp cdp_aware` ***[<port_list>]*** **[enable|disable]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enable CDP awareness (CDP discovery information is added to the LLDP neighbour table) **disable**: Disable CDP awareness (default: Show CDP awareness configuration)
Default Setting	disable

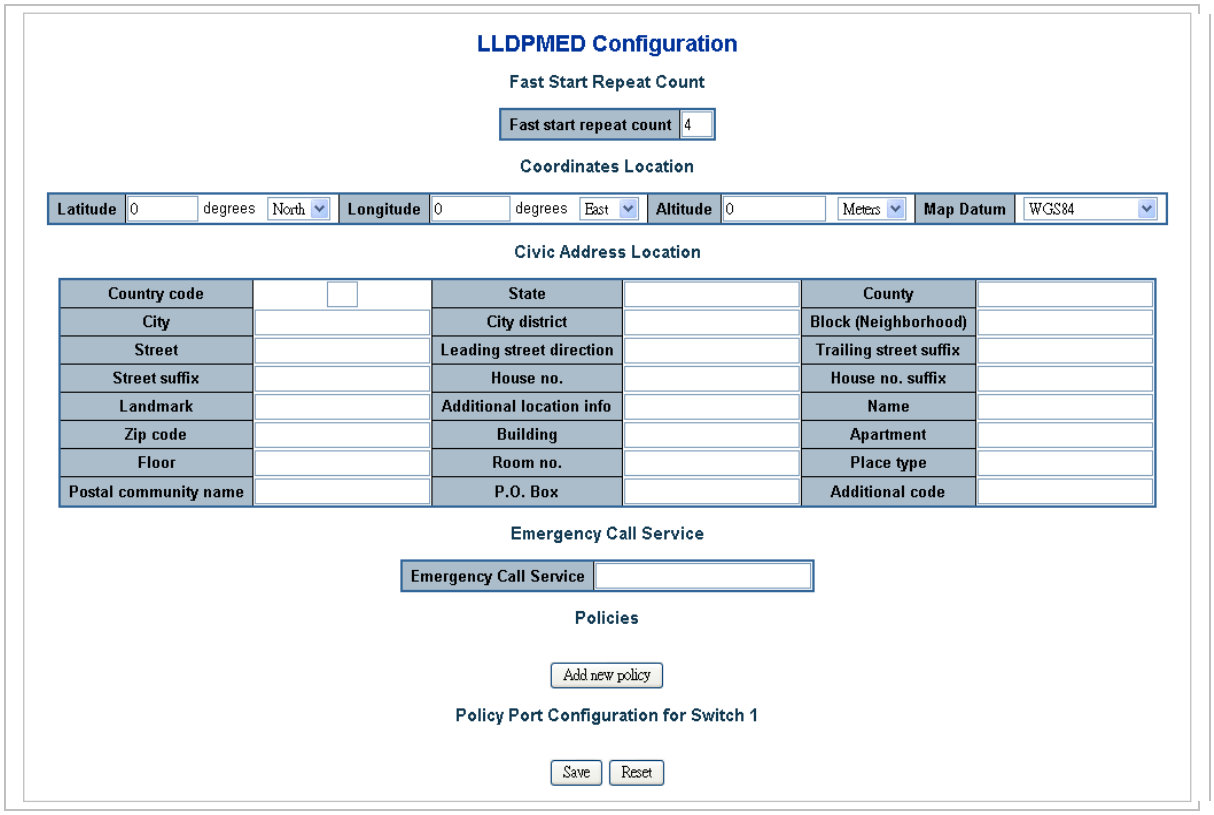
Example:

Enable CDP aware function for port1~4

```
SWITCH/>lldp cdp_aware 1-4 enable
```

4.13.3 LLDPMED Configuration

Configure the LLDP-MED.


LLDPMED Configuration
Fast Start Repeat Count
Fast start repeat count 4
Coordinates Location
Latitude 0 degrees North Longitude 0 degrees East Altitude 0 Meters Map Datum WGS84
Civic Address Location
Country code State County
City City district Block (Neighborhood)
Street Leading street direction Trailing street suffix
Street suffix House no. House no. suffix
Landmark Additional location info Name
Zip code Building Apartment
Floor Room no. Place type
Postal community name P.O. Box Additional code
Emergency Call Service
Emergency Call Service
Policies
Add new policy
Policy Port Configuration for Switch 1
Save Reset

The page includes the following fields:

- **Fast start repeat count**

Object	Description
Fast start repeat count	With Fast start repeat count it is possible to specify the number of times the fast start transmission is repeated. The recommended value is 4 times, giving that 4 LLDP frames with a 1 second interval will be transmitted, when a LLDP frame with new information is received. We recommend that fast start transmission is repeated multiple times to increase the possibility the neighbours receive the LLDP frame. LLDP-MED and the LLDP-MED Fast Start mechanism are only intended to run on links between LLDP-MED Network Connectivity Devices and Endpoint Devices and NOT to links between LAN infrastructure elements, including between Network Connectivity Devices, or to other types of links.

Console: LLDPMED Configuration	
Description	Show LLDP-MED configuration.
Syntax	`lldpmed configuration` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports

Example:

Show LLDP-MED configuration of port1~4

```
SWITCH/>lldpmed configuration 1-4

LLDP-MED Configuration:
=======================

Fast Start Repeat Count : 4
Location Coordinates     : Latitude                  - 0.0000 North
                           Longitude                 - 0.0000 East
                           Altitude                  - 0.0000 meter(s)
                           Map datum                 - WGS84
Civic Address Location   :


Port       Policies
1          none
2          none
3          none
4          none
```

Console: LLDPMED Fast	
Description	Set or show LLDP-MED Fast Start Repeat Count.
Syntax	`lldpmed fast` ***[<count>]***
Parameters	***<count>***: The number of times the fast start LLDPDU are being sent during the activation of the fast start mechanism defined by LLDP-MED (1-10).

- **Coordinates Location**

Object	Description
Latitude	Latitude SHOULD be normalized to within 0-90 degrees with a maximum of 4 digits. It is possible to specify the direction to either North of the equator or South of the equator.
Longitude	Longitude SHOULD be normalized to within 0-180 degrees with a maximum of 4 digits. It is possible to specify the direction to either East of the prime meridian or West of the prime meridian.
Altitude	Altitude SHOULD be normalized to within -32767 to 32767 with a maximum of 4 digits. It is possible to select between two altitude types (floors or meters). **Meters**: Representing meters of Altitude defined by the vertical datum specified. **Floors**: Inside a building, 0.0 represents the floor level associated with ground level at the main entrance.
Map Datum	The Map Datum used for the coordinates given in this Option **WGS84**: (Geographical 3D) - World Geodesic System 1984, CRS Code 4327, Prime Meridian Name: Greenwich. **NAD83/NAVD88**: This datum pair is to be used when referencing locations on land, not near tidal water (which would use Datum = NAD83/MLLW). **NAD83/MLLW**: This datum pair is to be used when referencing locations on water/sea/ocean.

Console: LLDPMED Coordinates	
Description	Set or show LLDP-MED Location.
Syntax	`lldpmed Coordinates` **`[latitude|longitude|altitude] [north|south|west|east|meters|floor] [coordinate_value]`**
Parameters	**latitude**: Latitude, 0 to 90 degrees with max. 4 digits (Positive numbers are north of the equator and negative numbers are south of the equator). **longitude**: Longitude,0 to 180 degrees with max. 4 digits (Positive values are East of the prime meridian and negative numbers are West of the prime meridian. **altitude**: Altitude, Meters or floors with max. 4 digits. (default: Show coordinate location configuration) **north|south|west|east|meters|floor:** **North**: North (Valid for latitude) **South**: South (Valid for latitude) **West**: West (Valid for longitude) **East**: East (Valid for longitude) **Meters**: Meters (Valid for altitude) **Floor**: Floor (Valid for altitude) lldpmed Coordinate value **coordinate_value**: lldpmed Coordinate value

Console: LLDPMED Datum	
Description	Set or show LLDP-MED Coordinates map datum.
Syntax	`lldpmed datum` **`[wgs84|nad83_navd88|nad83_mllw]`**
Parameters	**wgs84|nad83_navd88|nad83_mllw:** **wgs84**: WGS84 **nad83_navd88**: NAD83_NAVD88 **nad83_mllw**: NAD83_MLLW lldpmed Coordinate datum

- **Civic Address Location**

IETF Geopriv Civic Address based Location Configuration Information (Civic Address LCI).

Object	Description
Country code	The two-letter ISO 3166 country code in capital ASCII letters - Example: DK, DE or US.
State	National subdivisions (state, canton, region, province, prefecture).
County	County, parish, gun (Japan), district.
City	City, township, shi (Japan) - Example: Copenhagen
City district	City division, borough, city district, ward, chou (Japan)
Block (Neighbourhood)	Neighbourhood, block
Street	Street - Example: Poppelvej
Leading street direction	Leading street direction - Example: N
Trailing street suffix	Trailing street suffix - Example: SW
Street suffix	Street suffix - Example: Ave, Platz
House no.	House number - Example: 21
House no. suffix	House number suffix - Example: A, 1/2
Landmark	Landmark or vanity address - Example: Columbia University
Additional location info	Additional location info - Example: South Wing
Name	Name (residence and office occupant) - Example: Flemming Jahn
Zip code	Postal/zip code - Example: 2791
Building	Building (structure) - Example: Low Library
Apartment	Unit (Apartment, suite) - Example: Apt 42
Floor	Floor - Example: 4
Room no.	Room number - Example: 450F
Place type	Place type - Example: Office
Postal community name	Postal community name - Example: Leonia
P.O. Box	Post office box (P.O. BOX) - Example: 12345
Additional code	Additional code - Example: 1320300003

Console: LLDPMED Civic	
Description	Set or show LLDP-MED Civic Address Location.
Syntax	`lldpmed civic` **`[country|state|county|city|district|block|street|leading_street_direction|trailing_street_suffix|str_suf|house_no|house_no_suffix|landmark|additional_info|n`**

	ame|zip_code|building|apartment|floor|room_number|place_type|postal_com_name|p_o_box|additional_code] ***[<civic_value>]***
Parameters	**country**: Country **state**: National subdivisions (state, caton, region, province, prefecture) **county**: County, parish,gun (JP), district(IN) **city**: City, township, shi (JP) **district**: City division,borough, city, district, ward,chou (JP) **block**: Neighbourhood, block **street**: Street **leading_street_direction**: Leading street direction **trailing_street_suffix**: Trailing street suffix **str_suf**: Street Suffix **house_no**: House Number **house_no_suffix**: House number suffix **landmark**: Landmark or vanity address **additional_info**: Additional location information **name**: Name(residence and office occupant) **zip_code**: Postal/zip code **building**: Building (structure) **apartment**: Unit (apartment, suite) **floor**: Floor **room_number**: Room number **place_type**: Placetype **postal_com_name**: Postal community name **p_o_box**: Post office box (P.O. Box) **additional_code**: Additional code (default: Show Civic Address Location configuration) ***<civic_value>***: lldpmed value for the Civic Address Location entry.

- **Emergency Call Service**

Emergency Call Service (e.g. E911 and others), such as defined by TIA or NENA.

Object	Description
Emergency Call Service	Emergency Call Service ELIN identifier data format is defined to carry the ELIN identifier as used during emergency call setup to a traditional CAMA or ISDN trunk-based PSAP. This format consists of a numerical digit string, corresponding to the ELIN to be used for emergency calling.

Console: LLDPMED ECS	
Description	Set or show LLDP-MED Emergency Call Service.
Syntax	`lldpmed ecs` ***[<ecs_value>]***
Parameters	***<ecs_value>***: lldpmed The value for the Emergency Call Service

Policies

Network Policy Discovery enables the efficient discovery and diagnosis of mismatch issues with the VLAN configuration, along with the associated Layer 2 and Layer 3 attributes, which apply for a set of specific protocol applications on that port.

Policies are only intended for use with applications that have specific 'real-time' network policy requirements, such as interactive voice and/or video services.

The network policy attributes advertised are:

- Layer 2 VLAN ID (IEEE 802.1Q-2003)
- Layer 2 priority value (IEEE 802.1D-2004)
- Layer 3 Diffserv code point (DSCP) value (IETF RFC 2474)

LLDP-MED allows multiple policies to be advertised per port, each corresponding to a different application type. Different ports on the same Network Connectivity Device may advertise different sets of policies, based on the authenticated user identity or port configuration.

Object	Description
Delete	Check to delete the policy. It will be deleted during the next save.
Policy ID	ID for the policy. This is auto generated and shall be used when selecting the polices that shall be mapped to the specific ports.
Application Type	Intended use of the application types: • Voice • Voice Signalling • Guest Voice - a separate limited voice service for guest users and visitors • Guest Voice Signalling (conditional) - for use in network topologies that require a different policy for the guest voice signalling than for the guest voice media. • Softphone Voice - for use by softphone applications • Streaming • Video Signalling (conditional) - for use in network topologies that require a separate policy for the video signalling than for the video media.
Tag	Tag indicating whether the specified application type is using a 'tagged' or an 'untagged' VLAN.
VLAN ID	LAN identifier (VID) for the port
L2 Priority	L2 Priority is the Layer 2 priority to be used for the specified application type. L2 Priority may specify one of eight priority levels (0 through 7). A value of 0 represents use of the default priority.
DSCP	DSCP value to be used to provide Diffserv node behaviour for the specified application type. DSCP may contain one of 64 code point values (0 through 63). A value of 0 represents use of the default value.

- **Port Policies Configuration**

Every port may advertise a unique set of network policies or different attributes for the same network policies, based on the authenticated user identity or port configuration.

Object	Description
Port	The port number for which the configuration applies.
Policy ID	The set of policies that shall apply for a given port. The set of policies is selected by check marking the checkboxes that corresponds to the policies

Buttons

: click to add new policy.

Console: LLDPMED Port Policy	
Description	Set or show LLDP-MED port policies.
Syntax	`lldpmed port policies` ***[<port_list>] [<policy_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports ***<policy_list>***: List of policies to delete

Console: LLDPMED Policy Delete	
Description	Delete the selected policy.
Syntax	`lldpmed policy delete` ***[<policy_list>]***
Parameters	***<policy_list>***: List of policies to delete

Example:

Delete the policy 1

```
SWITCH/>lldpmed policy delete 1
```

Console: LLDPMED Policy Add	
Description	Adds a policy to the list of polices.
Syntax	`lldpmed policy add` **[voice|voice_signaling|guest_voice|guest_voice_signaling|softphone_voice|video_conferencing|streaming_video|video_signaling] [tagged|untagged]** ***[<vlan_id>] [<l2_priority>] [<dscp>]***
Parameters	**voice** : Voice for use by dedicated IP Telephony handsets and similar appliances supporting interactive voice services. **voice_signaling**: Voice Signalling (conditional) for use in network topologies requiring a different policy for voice signalling. **guest_voice**: support a separate limited voice service for guest users and visitors **guest_voice_signaling** : Guest Voice Signalling (conditional) for use in network topologies requiring different policy for the guest voice signalling. **softphone_voice**: Softphone Voice for use by softphone applications on typical data centric devices, such as PCs or laptops. **video_conferencing**: Video Conferencing for use by dedicated Video Conferencing equipment and other similar appliances. **streaming_video**: for use by broadcast or multicast based video content distribution and other similar applications supporting streaming video services that require specific network policy treatment. **video_signaling**: Video Signalling (conditional) for use in network topologies that require a separate policy for the video signalling than for the video media. **tagged**: The device is using tagged frames **untagged**: The device is using untagged frames ***<vlan_id>***: VLAN id ***<l2_priority>***: This field may specify one of eight priority levels (0 through 7) ***<dscp>***: DSCP value to be used to provide Diffserv node behaviour for the specified application type. This 6 bit field may contain one of 64 code point values (0 through 63). A value of 0 represents use of the default DSCP value.

4.13.4 LLDP-MED Neighbour

This page provides a status overview for all LLDP-MED neighbours. The displayed table contains a row for each port on which an LLDP neighbour is detected.

The page includes the following fields:

- **Fast start repeat count**

Object	Description
Port	The port on which the LLDP frame was received.

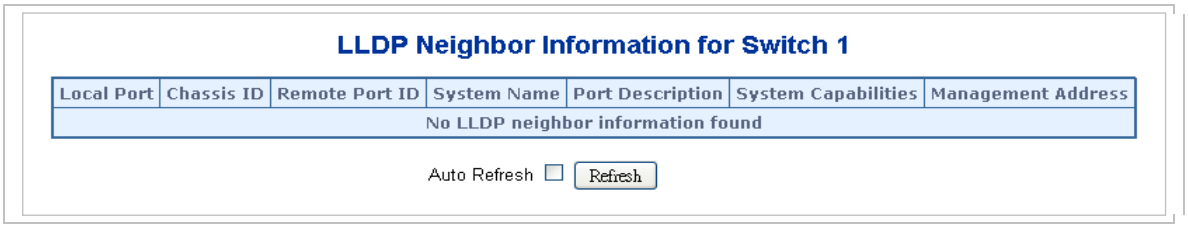
Device Type	LLDP-MED Devices are comprised of two primary Device Types: Network Connectivity Devices and Endpoint Devices. An LLDP-MED Network Connectivity Device is a LAN access device based on any of the following technologies: • LAN Switch/Router • IEEE 802.1 Bridge • IEEE 802.3 Repeater (included for historical reasons) • IEEE 802.11 Wireless Access Point • Any device that supports the IEEE 802.1AB and MED extensions defined by TIA-1057 and can relay IEEE 802 frames via any method. Definition LLDP-MED Generic Endpoint (Class I) Such devices may include (but are not limited to) IP Communication Controllers, other communication related servers, or any device requiring basic services as defined in TIA-1057. Discovery services defined in this class include LAN configuration, device location, network policy, power management, and inventory management. LLDP-MED Media Endpoint (Class II) Capabilities include all of the capabilities defined for the previous Generic Endpoint Class (Class I), and are extended to include aspects related to media streaming. Example product categories expected to adhere to this class include (but are not limited to) Voice / Media Gateways, Conference Bridges, Media Servers, and similar. Discovery services defined in this class include media-type-specific network layer policy discovery. LLDP-MED Communication Endpoint (Class III) Capabilities include all of the capabilities defined for the previous Generic Endpoint (Class I) and Media Endpoint (Class II) classes, and are extended to include aspects related to end user devices. Example product categories expected to adhere to this class include (but are not limited to) end user communication appliances, such as IP Phones, PC-based softphones, or other communication appliances that directly support the end user. Discovery services defined in this class include provision of location identifier (including ECS / E911 information), embedded L2 switch support, inventory management
LLDP-MED Capabilities	LLDP-MED Capabilities describes the neighbour unit's LLDP-MED capabilities. The possible capabilities are: • Network Policy • Location Identification • Extended Power via MDI - PSE • Extended Power via MDI - PD • Inventory • Reserved
Application Type	The possible application types are shown below. • Voice • Voice Signalling (conditional) - for use in network topologies that require a different policy for the voice signalling than for the voice media. • Guest Voice - support a separate 'limited feature-set' voice service for guest users and visitors • Guest Voice Signalling (conditional) - for use in network topologies that require a different policy for the guest voice signalling than for the guest voice media. • Softphone Voice - for use by softphone applications on typical data centric devices, such as PCs or laptops. • Streaming • Video Signalling (conditional) - for use in network topologies that require a separate policy for the video signalling than for the video media.
Policy	Policy • Unknown: The network policy for the specified application type is currently unknown. • Defined: The network policy is defined.
TAG	TAG is indicating whether the specified application type is using a tagged or an untagged VLAN. Can be Tagged or Untagged
VLAN ID	VLAN ID is the VLAN identifier (VID) for the port. A value of 1 through 4094 is used to define a valid VLAN ID. A value of 0 (Priority Tagged) is used if the device is using priority tagged frames the default PVID of the ingress port is used instead.
Priority	Priority is the Layer 2 priority to be used for the specified application type. One of eight priority levels (0 through 7)

DSCP	DSCP is the DSCP value to be used to provide Diffserv node behaviour for the specified application type as defined in IETF RFC 2474. Contain one of 64 code point values (0 through 63).

Console: LLDPMED Info	
Description	Show LLDP-MED neighbour device information.
Syntax	`lldpmed info` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports

4.13.5 Neighbour

This page provides a status overview for all LLDP neighbours. The displayed table contains a row for each port on which an LLDP neighbour is detected.



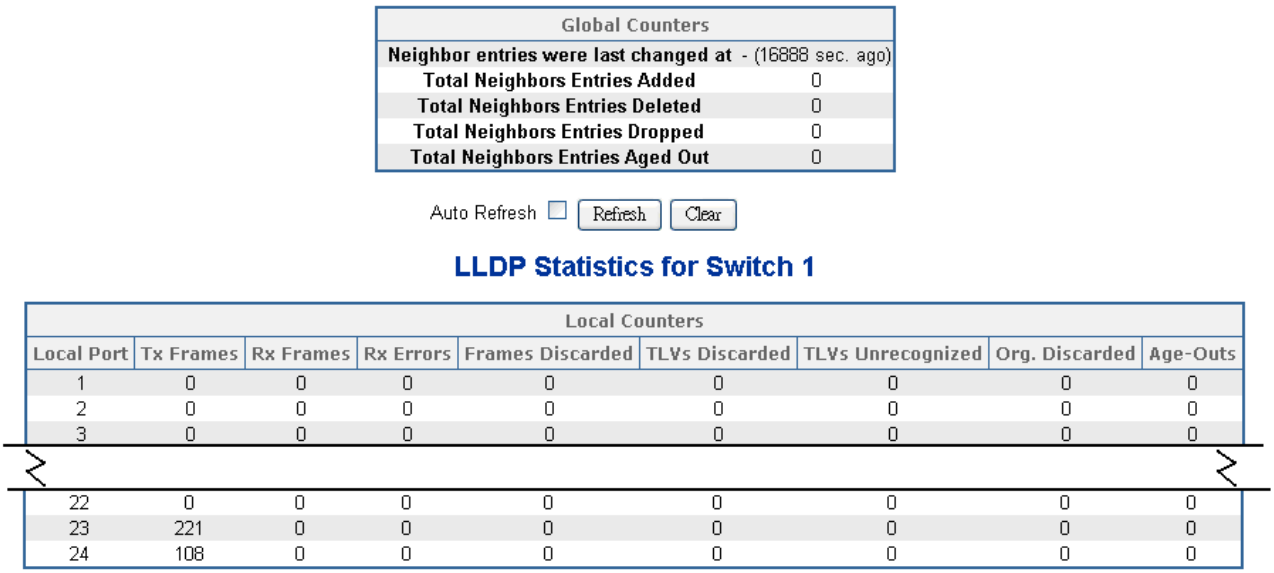
The page includes the following fields:

Object	Description
Local Port	The port on which the LLDP frame was received.
Chassis ID	The Chassis ID is the identification of the neighbour's LLDP frames.
Remote Port ID	The Remote Port ID is the identification of the neighbour port.
System Name	System Name is the name advertised by the neighbour unit.
Port Description	Port Description is the port description advertised by the neighbour unit.
System Capabilities	System Capabilities describes the neighbour unit's capabilities. The possible capabilities are: • Other • Repeater • Bridge • WLAN Access Point • Router • Telephone • DOCSIS cable device • Station only • Reserved When a capability is enabled, the capability is followed by (+). If the capability is disabled, the capability is followed by (-).
Management Address	ManagementAddress is the neighbour unit's address that is used for higher layer entities to assist the discovery by the network management. This could for instance hold the neighbour's IP address.

Console: LLDP Info	
Description	Show LLDP neighbour device information.
Syntax	`lldp info` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports

4.13.6 Port Statistics

This page provides an overview of all LLDP traffic. Two types of counters are shown. Global counters are counters that refer to the whole stack, switch, while local counters refer to counters for the currently selected switch.



Global Counters	
Neighbor entries were last changed at	- (16888 sec. ago)
Total Neighbors Entries Added	0
Total Neighbors Entries Deleted	0
Total Neighbors Entries Dropped	0
Total Neighbors Entries Aged Out	0

Auto Refresh Refresh Clear

LLDP Statistics for Switch 1

Local Counters								
Local Port	Tx Frames	Rx Frames	Rx Errors	Frames Discarded	TLVs Discarded	TLVs Unrecognized	Org. Discarded	Age-Outs
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0
23	221	0	0	0	0	0	0	0
24	108	0	0	0	0	0	0	0

The page includes the following fields:

- **Global Counters**

Object	Description
Neighbour entries were last changed at	Shows the time for when the last entry was last deleted or added. It is also shows the time elapsed since last change was detected.
Total Neighbours Entries Added	Shows the number of new entries added since switch reboot.
Total Neighbours Entries Deleted	Shows the number of new entries deleted since switch reboot.
Total Neighbours Entries Dropped	Shows the number of LLDP frames dropped due to that the entry table was full.
Total Neighbours Entries Aged Out	Shows the number of entries deleted due to Time-To-Live expiring.

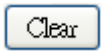
- **Local Counters**

The displayed table contains a row for each port. The columns hold the following information:

Object	Description
Local Port	The port on which LLDP frames are received or transmitted.
Tx Frames	The number of LLDP frames transmitted on the port.
Rx Frames	The number of LLDP frames received on the port.
Rx Errors	The number of received LLDP frames containing some kind of error.
Frames Discarded	If an LLDP frame is received on a port, and the switch's internal table has run full, the LLDP frame is counted and discarded. This situation is known as "Too Many Neighbours" in the LLDP standard. LLDP frames require a new entry in the table when the Chassis ID or Remote Port ID is not already contained within the table. Entries are removed from the table when a given port links down, an LLDP shutdown frame is received, or when the entry ages out.

TLVs Discarded	Each LLDP frame can contain multiple pieces of information, known as TLVs (TLV is short for "Type Length Value"). If a TLV is malformed, it is counted and discarded.
TLVs Unrecognized	The number of well-formed TLVs, but with an unknown type value.
Org. Discarded	The number of organizationally TLVs received.
Age-Outs	Each LLDP frame contains information about how long time the LLDP information is valid (age-out time). If no new LLDP frame is received within the age out time, the LLDP information is removed, and the Age-Out counter is incremented.

Buttons


: Clears the local counters. All counters (including global counters) are cleared upon reboot.

Console: LLDP Statistics	
Description	Show LLDP Statistics.
Syntax	`lldp statistics` ***[<port_list>]*** **[clear]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **clear**: Clear LLDP statistics

Example:

Show LLDP Statistics of port 1

```
SWITCH/>lldp statistics 1

LLDP global counters
Neighbour entries was last changed at - (323592 sec. ago).
Total Neighbours Entries Added    0.
Total Neighbours Entries Deleted  0.
Total Neighbours Entries Dropped  0.
Total Neighbours Entries Aged Out 0.

LLDP local counters
       Rx       Tx       Rx       Rx       Rx TLV   Rx TLV   Rx TLV
Port   Frames   Frames   Errors   Discards Errors   Unknown  Organz.  Aged
----   ------   ------   ------   -------- ------   -------  -------  -----
1       0        0        0        0        0        0        0        0
```

Console: LLDPMED Debug_med_transmit_var	
Description	Set or show if the current value of the global medTansmitEnable variable (Section Section 11.2.1, TIA 1057).
Syntax	`lldpmed debug_med_transmit_var` ***[<port_list>]*** **[enable|disable]**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable** : Enable - Set medTansmitEnable variable to true **disable**: Disable - Set medTansmitEnable variable to false (default: Show medTansmitEnable variable value)

4.14 Network Diagnostics

This section provides the Physical layer and IP layer network diagnostics tools for troubleshooting. Use the Diagnostics menu items to display and configure basic administrative details of the Managed Switch. This section has the following items:

- Ping
- IPv6 Ping

- Cable Diagnostic

PING

The ping and IPv6 ping allow you to issue ICMP PING packets to troubleshoot IP connectivity issues. The Managed Switch transmits ICMP packets, and the sequence number and roundtrip time are displayed upon reception of a reply.

Cable Diagnostics

Cable Diagnostics is provided for performing tests on copper cables. These functions identify the cable length and operating conditions, and isolate a variety of common faults that can occur on the Cat5 twisted-pair cabling.

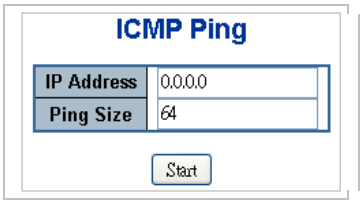
Buttons

Start: Click to start to transmit ICMP packets.

4.14.1 Ping

ICMP PING packets can be issued to troubleshoot IP connectivity issues.

5 ICMP packets are transmitted on pressing **Start**, and the sequence number and roundtrip time are displayed upon reception of a reply. The page refreshes automatically until responses to all packets are received, or until a timeout occurs.



The page includes the following fields:

Object	Description
IP Address	The destination IP Address.
Ping Size	The payload size of the ICMP packet. Values range from 8 bytes to 1400 bytes.

Note

Be sure the target IP Address is within the same network subnet of the switch and that the IP address is set correctly.

Buttons

Start: Click to transmit ICMP packets.

Console: IP Ping	
Description	Ping IP address (ICMP echo).
Syntax	`ip ping` ***<ip_addr_string> [<ping_length>]***
Parameters	***<ip_addr_string>***: IP host address (a.b.c.d) or a host name string ***<ping_length>***: Ping data length (8-1400), excluding MAC, IP and ICMP headers

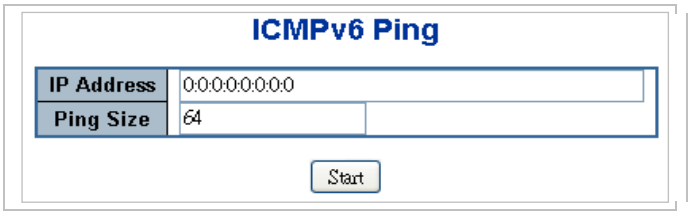
Example:

```
SWITCH/>ip ping 192.168.0.21
PING server 192.168.0.21
60 bytes from 192.168.0.21: icmp seq=0, time=0ms
60 bytes from 192.168.0.21: icmp seq=1, time=0ms
60 bytes from 192.168.0.21: icmp seq=2, time=0ms
60 bytes from 192.168.0.21: icmp seq=3, time=10ms
60 bytes from 192.168.0.21: icmp_seq=4, time=0ms
Sent 5 packets, received 5 OK, 0 bad
```

4.14.2 IPv6 Ping

This page allows you to issue ICMPv6 PING packets to troubleshoot IPv6 connectivity issues.

5 ICMPv6 packets are transmitted, and the sequence number and roundtrip time are displayed upon reception of a reply. The page refreshes automatically until responses to all packets are received, or until a timeout occurs.



The page includes the following fields:

Object	Description
IPv6 Address	The destination IPv6 Address.
Ping Size	The payload size of the ICMP packet. Values range from 8 bytes to 1400 bytes.

Buttons

Start: Click to transmit ICMP packets.

Console: IP IPv6 Ping	
Description	Ping IPv6 address (ICMPv6 echo).
Syntax	`ip ipv6 ping6 <`***ipv6_addr> [<ping_length>]***
Parameters	***<ipv6_addr>***: IPv6 host address. * ***<ping_length>***: Ping data length (8-1400), excluding MAC, IP and ICMP headers

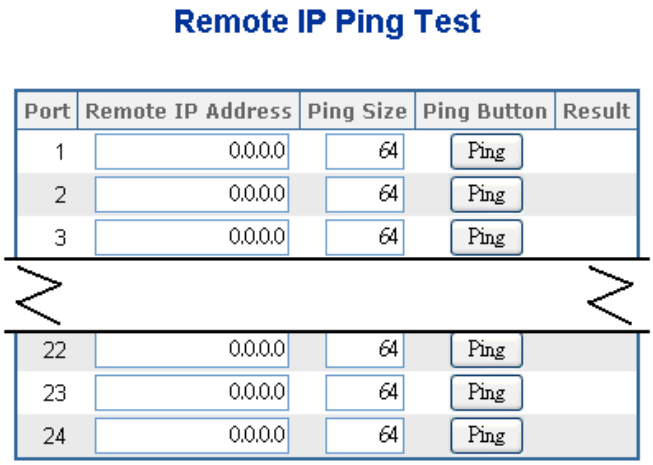
Example:

```
SWITCH/>ip ipv6 ping 2001::0002
PING6 server 2001::2
68 bytes from 2001::2: icmp seq=0, time=0ms
68 bytes from 2001::2: icmp_seq=1, time=0ms
68 bytes from 2001::2: icmp_seq=2, time=0ms
68 bytes from 2001::2: icmp seq=3, time=0ms
68 bytes from 2001::2: icmp seq=4, time=0ms
Sent 5 packets, received 5 OK, 0 bad
```

4.14.3 Remote IP Ping Test

This page allows you to issue ICMP PING packets to troubleshoot IP connectivity issues on special port.

5 ICMP packets are transmitted, and the sequence number and roundtrip time are displayed upon reception of a reply. The page refreshes automatically until responses to all packets are received, or until a timeout occurs.



The page includes the following fields:

Object	Description
Port	The logical port for the settings.
Remote IP Address	The destination IP Address.
Ping Size	The payload size of the ICMP packet. Values range from 8 bytes to 1400 bytes.
Result	Display the ping result.

4.14.4 Cable Diagnostics

This page is used for running Cable Diagnostics.

Press to run the diagnostics. Tests can take approximately 5-15 seconds depending on the number of tested ports. When completed, the page refreshes automatically, and results are displayed in a status table. Note that Cable Diagnostics is only accurate for cables of length 7 - 140 meters.

10 and 100 Mbps ports will be linked down while running cable diagnostic. Therefore, running cable diagnostic on a 10 or 100 Mbps management port will cause the switch to stop responding until VeriPHY is complete. The ports belong to the currently selected stack unit.

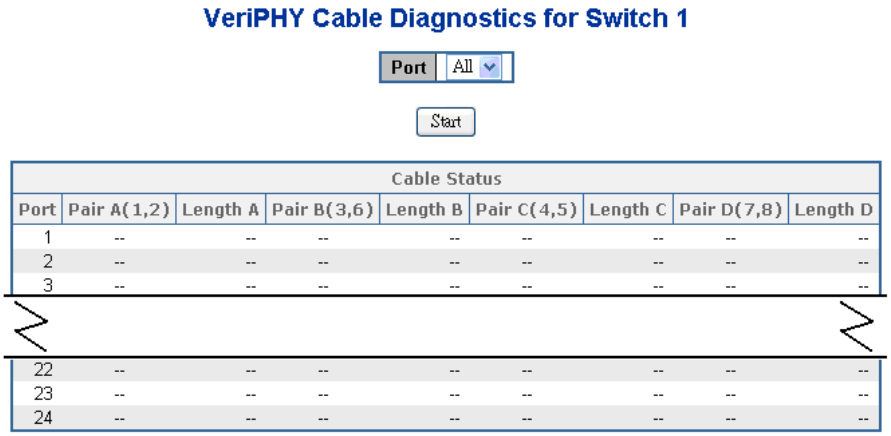
Possible states are as follows:

- If the link is established on the twisted-pair interface in 1000Base-T mode, the Cable Diagnostics can run without disruption of the link or of any data transfer.

- If the link is established in 100Base-TX or 10Base-T, the Cable Diagnostics cause the link to drop while the diagnostics are running.

After the diagnostics are finished, the link is re-established. And the following functions are available.

- Coupling between cable pairs.
- Cable pair termination
- Cable Length



The page includes the following fields:

Object	Description
Port	Request Cable Diagnostics on this port.
Cable Status	**Port**: Port number. **Pair**: The status of the cable pair. **Length**: The length (in meters) of the cable pair.

Buttons

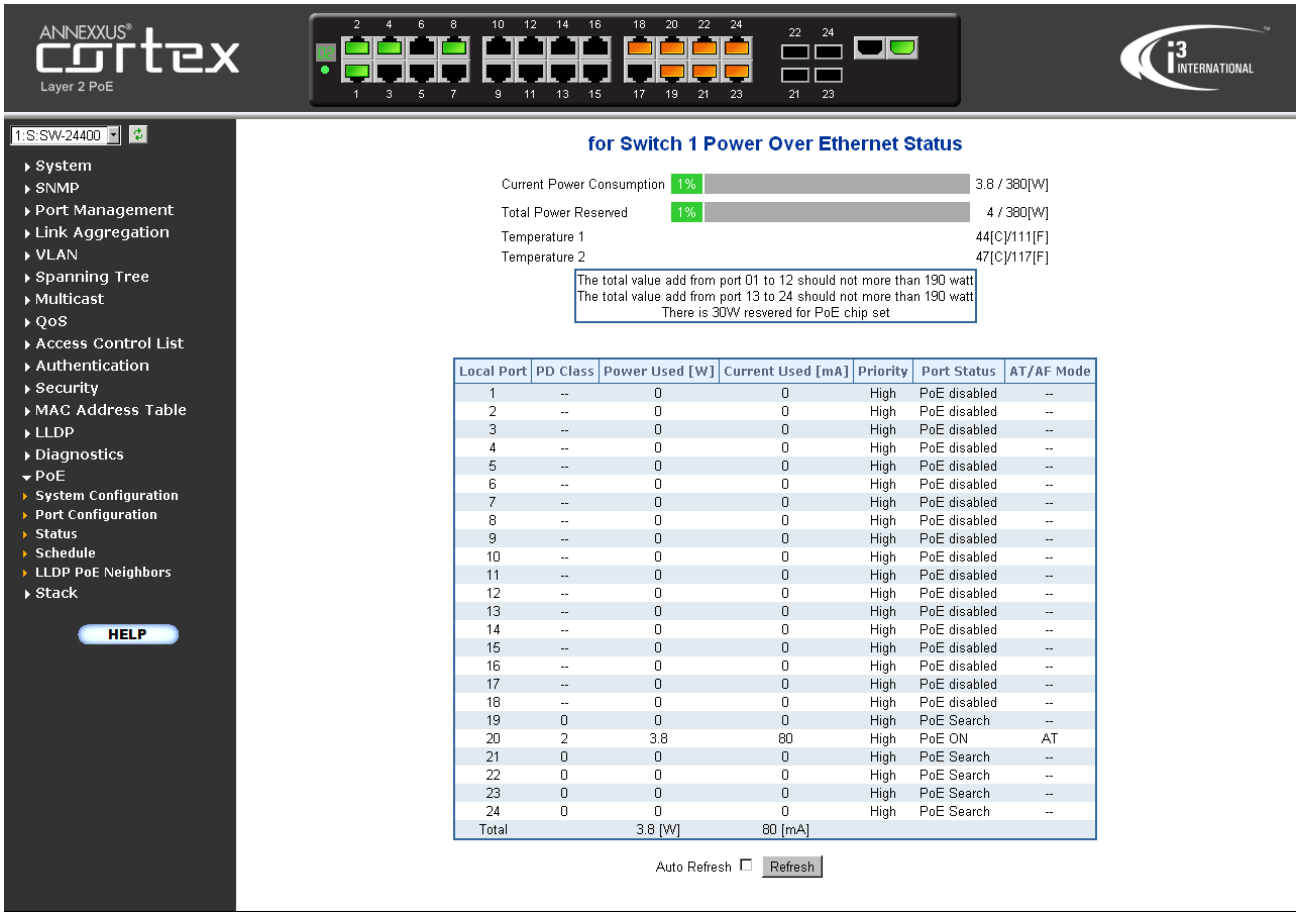
Start: Click to run the diagnostics.

Console: Port VeriPHY	
Description	Run cable diagnostics.
Syntax	`port veriphy` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports

4.15 Power over Ethernet

Providing up to 24 PoE, in-line power interface, the SW-24400 PoE Switch can easily build a centrally-controlled IP Camera system for the enterprise.

The **SW-24400** has IEEE **802.3at mode** and supplies max. power up to **30.8 watts**.


ANNEXXUS
cortex
Layer 2 PoE
2 4 6 8 10 12 14 16 18 20 22 24
1 3 5 7 9 11 13 15 17 19 21 23
22 24
21 23
i3 INTERNATIONAL
1:S:SW-24400
System
SNMP
Port Management
Link Aggregation
VLAN
Spanning Tree
Multicast
QoS
Access Control List
Authentication
Security
MAC Address Table
LLDP
Diagnostics
PoE
System Configuration
Port Configuration
Status
Schedule
LLDP PoE Neighbors
Stack
HELP
for Switch 1 Power Over Ethernet Status
Current Power Consumption 1% 3.8 / 380[W]
Total Power Reserved 1% 4 / 380[W]
Temperature 1 44[C]/111[F]
Temperature 2 47[C]/117[F]
The total value add from port 01 to 12 should not more than 190 watt
The total value add from port 13 to 24 should not more than 190 watt
There is 30W resvered for PoE chip set
Local Port | PD Class | Power Used [W] | Current Used [mA] | Priority | Port Status | AT/AF Mode
1 -- 0 0 High PoE disabled --
2 -- 0 0 High PoE disabled --
3 -- 0 0 High PoE disabled --
4 -- 0 0 High PoE disabled --
5 -- 0 0 High PoE disabled --
6 -- 0 0 High PoE disabled --
7 -- 0 0 High PoE disabled --
8 -- 0 0 High PoE disabled --
9 -- 0 0 High PoE disabled --
10 -- 0 0 High PoE disabled --
11 -- 0 0 High PoE disabled --
12 -- 0 0 High PoE disabled --
13 -- 0 0 High PoE disabled --
14 -- 0 0 High PoE disabled --
15 -- 0 0 High PoE disabled --
16 -- 0 0 High PoE disabled --
17 -- 0 0 High PoE disabled --
18 -- 0 0 High PoE disabled --
19 0 0 0 High PoE Search --
20 2 3.8 80 High PoE ON AT
21 0 0 0 High PoE Search --
22 0 0 0 High PoE Search --
23 0 0 0 High PoE Search --
24 0 0 0 High PoE Search --
Total 3.8 [W] 80 [mA]
Auto Refresh
Refresh

4.15.1 Power Configuration

Operating power is applied from a power source (PSU-power supply unit) over the LAN infrastructure to powered devices (PDs), which are connected to ports. The power budget is managed according to the following user-definable parameters: maximum available power, ports priority, maximum allowable power per port.

There are five modes for configuring how the ports/PDs may reserve power and when to shut down ports.

- **Classification mode**

In this mode each port automatic determines how much power to reserve according to the class the connected PD belongs to, and reserves the power accordingly. Four different port classes exist and one for 4, 7, 15.4 and 30.8 Watts.

Class	Usage	Range of maximum power used by the PD	Class Description
0	Default	0.44 to 12.95 Watts	Classification unimplement
1	Optional	0.44 to 3.84 Watts	Very low power
2	Optional	3.84 to 6.49 Watts	Low power
3	Optional	6.49 to 12.95 Watts (or to 15.4Watts)	Mid power
4	Optional	12.95 to 25.50 Watts (or to 30.8Watts)	High power

In this mode the **Maximum Power fields** have no effect.

➢ **Allocation mode**

In this mode the user allocates the amount of power that each port may reserve. The allocated/reserved power for each port/PD is specified in the Maximum Power fields. The ports are shut down when total reserved powered exceeds the amount of power that the power supply can deliver.

In this mode the port power is not turned on if the PD requests more power the available.

➢ **Consumption mode**

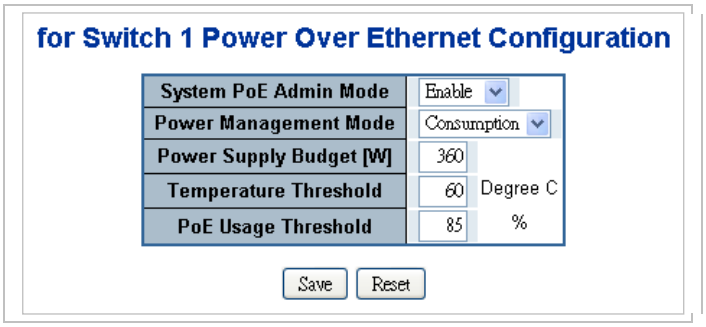
In this mode the ports are shut down when the actual power consumption for all ports exceeds the amount of power that the power supply can deliver or if the actual power consumption for a given port exceeds the reserved power for that port. The ports are shut down according to the ports priority. If two ports have the same priority the port with the highest port number is shut down.

➢ **Priority mode**

In this mode the user assign the priority to the ports/PD. When the total PoE power consumption request is over the allowed power supply limitation, the system shut down PoE ports by port priority setting.

Ethernet Port Configuration

This section allows the user to inspect and configure the current PoE port settings.



The page includes the following fields:

Object	Description
System PoE Admin Mode	Enable or disable PoE function for all ports
Power Management Mode	There are five modes for configuring how the ports/PDs may reserve power and when to shut down ports. • Classification mode • Allocation mode • Consumption mode • Priority mode The default PoE management mode is "Consumption mode".
Power Supply Budget [W]	Set limit value of the total PoE port provided power to the PDs. The available max. value is 360.

Temperature Threshold	Allows setting over temperature protection threshold value. It system temperature was over it then system lower total PoE power budget automatically.
PoE Usage Threshold	Allows setting how much PoE power budget could be limited.

The total PoE power reservation from Port-1~24 is up to **360W**

Console: PoE Configuration	
Description	Show PoE configuration.
Syntax	`poe configuration` ***[<port_list>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports

Example:

Show PoE configuration.

```
SWITCH/>poe configuration

Port  Mode     Priority  Max.Power[W]     PowerAlloc[W]
----  -------  --------  ---------------  -------------
1     Enabled  High      15.4             15.4
2     Enabled  High      15.4             15.4
3     Enabled  High      15.4             15.4
4     Enabled  High      15.4             15.4
5     Enabled  High      15.4             15.4
6     Enabled  High      15.4             15.4
7     Enabled  High      15.4             15.4
8     Enabled  High      15.4             15.4
9     Enabled  High      15.4             15.4
10    Enabled  High      15.4             15.4
11    Enabled  High      15.4             15.4
12    Enabled  High      15.4             15.4
13    Enabled  High      15.4             15.4
14    Enabled  High      15.4             15.4
15    Enabled  High      15.4             15.4
16    Enabled  High      15.4             15.4
17    Enabled  High      15.4             15.4
18    Enabled  High      15.4             15.4
19    Enabled  High      15.4             15.4
20    Enabled  High      15.4             15.4
21    Enabled  High      15.4             15.4
22    Enabled  High      15.4             15.4
23    Enabled  High      15.4             15.4
24    Enabled  High      15.4             15.4

Power management mode
---------------------
Power management mode : automode
```

Console: PoE Management Mode	
Description	Show / Set PoE management mode.
Syntax	`poe mgmt_mode` **[mgt_class|mgt_alloc|mgt_consumption|mgt_priority]**
Parameters	**mgt_class**: handle power allocation according to PD class **mgt_alloc**: power allocated according to values entered in power allocation **mgt_consumption**: allocated according to PD actual need, with a maximum of 15.4 W per port **mgt_priority**: max. port power determined by priority (default: Show PoE power management mode)
Default Setting	consumption mode

Example:

Set priority mode for PoE function.

```
SWITCH/>poe mgmt_mode mgt_priority
```

PD Classifications

PD classification provides information about the maximum power required by the PD during operation. Class 0 is the default for PDs. However, to improve power management at the PSE, the PD may opt to provide a signature for Class 1 to 4.

The PD is classified based on power. The classification of the PD is the maximum power that the PD will draw across all input voltages and operational modes.

A PD shall return Class 0 to 4 in accordance with the maximum power draw as specified by Table 4-16-1.

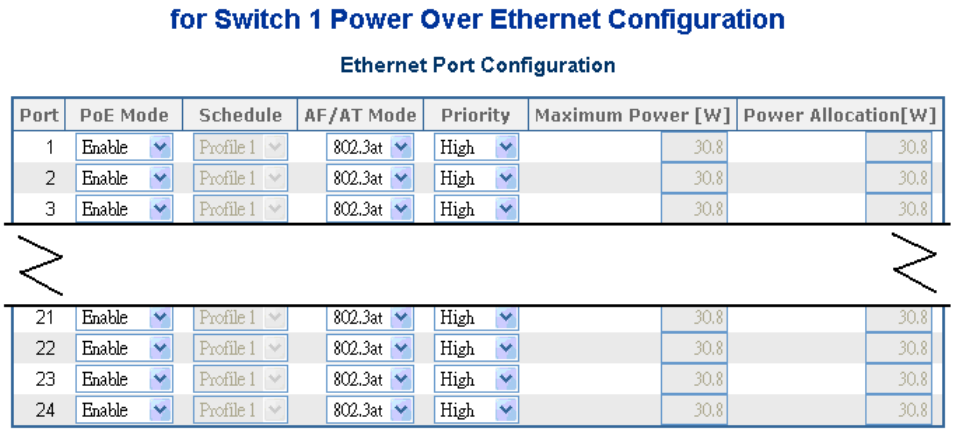
Class	Usage	Range of maximum power used by the PD	Class Description
0	Default	0.44 to 12.95 Watts	Classification unimplement
1	Optional	0.44 to 3.84 Watts	Very low power
2	Optional	3.84 to 6.49 Watts	Low power
3	Optional	6.49 to 12.95 Watts (or to 15.4Watts)	Mid power
4	Optional	12.95 to 25.50 Watts (or to 30.8Watts)	High power

Table 4-16-1 Device class

The **SW-24400** has IEEE **802.3at mode** and supplies max. power up to **30.8 watts**.

4.15.2 Port Configuration

This section allows the user to inspect and configure the current PoE port settings.


for Switch 1 Power Over Ethernet Configuration
Ethernet Port Configuration
Port
PoE Mode
Schedule
AF/AT Mode
Priority
Maximum Power [W]
Power Allocation[W]
1 Enable Profile 1 802.3at High 30.8 30.8
2 Enable Profile 1 802.3at High 30.8 30.8
3 Enable Profile 1 802.3at High 30.8 30.8
21 Enable Profile 1 802.3at High 30.8 30.8
22 Enable Profile 1 802.3at High 30.8 30.8
23 Enable Profile 1 802.3at High 30.8 30.8
24 Enable Profile 1 802.3at High 30.8 30.8

The page includes the following fields:

Object	Description
PoE Mode	There are three modes for PoE mode. • **Enable**: enable PoE function. • **Disable**: disable PoE function. • **Schedule**: enable PoE function in schedule mode.

Schedule	Indicates the schedule profile mode. Possible profiles are: • **Profile1** • **Profile2** • **Profile3** • **Profile4**
AF / AT Mode	There are two modes for PoE mode. • **802.3af:** enable IEEE 802.3af PoE function. • **802.3at:** disable IEEE 802.3at high power PoE function.
Priority	The Priority represents the ports priority. There are three levels of power priority named Low, High and Critical. The port with the lowest priority will be turned off starting from the port with the lowest port number.
Maximum Power	The maximum power in watts that can be delivered to a remote device.Once power overload is detected, the port will auto shut down and keep on detection mode until PD's power consumption is lower than the power limit value.
Power Allocation	Limit the port PoE supply watts. Once power overload is detected, the port will auto shut down and keep on detection mode until PD's power consumption is lower than the power limit value

The **SW-24400** has IEEE **802.3at mode** and supplies max. power up to **30.8 watts**.

Console: PoE Priority	
Description	Show / Set PoE Priority.
Syntax	`poe priority` ***[<port_list>]*** **`[low|high|critical]`**
Parameters	***<port_list>***: Port list or 'all', default: All ports **low**: Set priority to low **high**: Set priority to high **critical**: Set priority to critical (default: Show PoE priority)
Default Setting	high

Example:

Set low priority for port21~24

```
SWITCH/>poe priority 21-24 low
```

Console: PoE Mode	
Description	Set or show the PoE mode.
Syntax	`poe mode` ***[<port_list>]*** **`[enable|disable] [af|at]`**
Parameters	***<port_list>***: Port list or 'all', default: All ports **enable**: Enables PoE **disable**: Disable PoE (default: Show PoE mode) **af** : PoE to af mode **at** : PoE to at mode (default: Show PoE's af/at mode)
Default Setting	enable

Example:

Disable PoE function of port1~4

```
SWITCH/>poe mode1-4 disable
```

Console: PoE Maximum Power	
Description	Set or show PoE maximum power per port (0-30.8, with one digit).
Syntax	`poe maximum_power` ***[<port_list>] [<port_power>]***
Parameters	***<port_list>***: Port list or 'all', default: All ports ***<port_power>***: PoE maximum power for the port (0-30.8)
Default Setting	30.8

Example:

Set maximum power in 10 watts for port1~4.

```
SWITCH/>poe maximum_power 1-4 10
```

Console: PoE Allocated Power	
Description	Set or show PoE maximum power allocated per port (0-30.8, with one digit).
Syntax	`poe alloc_power` **[<port_list>] [<alloc_power>]**
Parameters	**<port_list>** : Port list or 'all', default: All ports **<alloc_power>**: PoE maximum power allocated for the port (0-30.8)
Default Setting	30.8

Example:

Set PoE maximum power allocated in 10 watts for port1~4.

```
SWITCH/>poe alloc_power 1-4 10
```

Console: PoE Power Supply	
Description	Set or show the value of the power supply.
Syntax	`poe power_supply` ***[<supply_power>]***
Parameters	***< supply_power>***: PoE power for a power supply
Default Setting	30.8

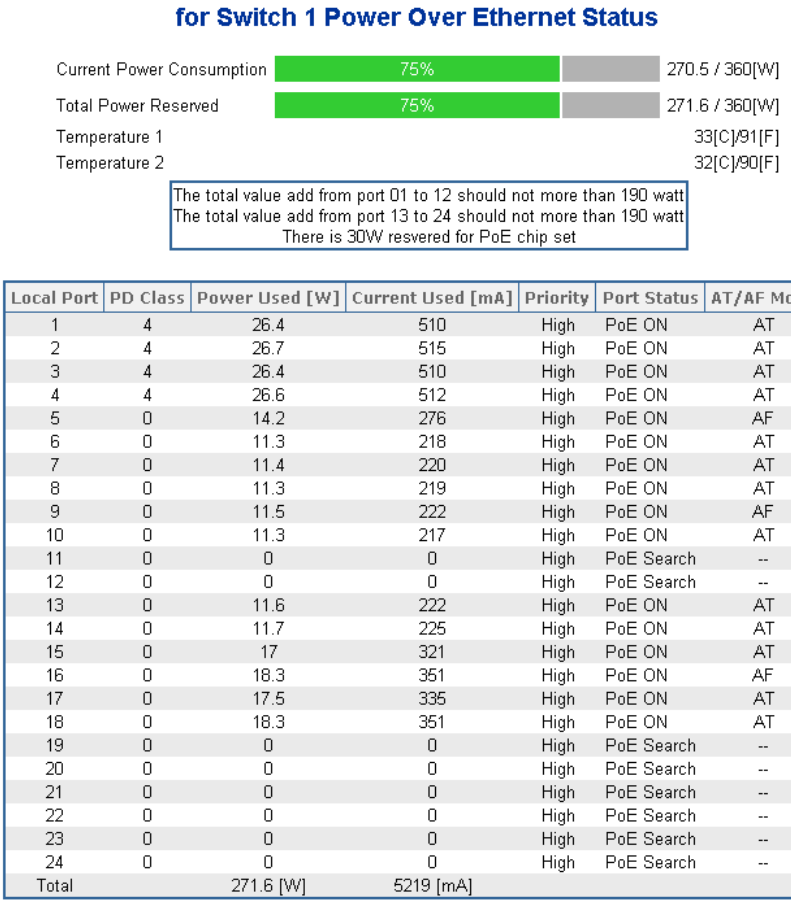
Example:

Set 200 watts of power supply.

```
SWITCH/>poe power_supply 200
```

4.15.3 PoE Status

This page allows the user to inspect the total power consumption, total power reserved and current status for all PoE ports.


for Switch 1 Power Over Ethernet Status
Current Power Consumption
75%
270.5 / 360[W]
Total Power Reserved
75%
271.6 / 360[W]
Temperature 1
33[C]/91[F]
Temperature 2
32[C]/90[F]
The total value add from port 01 to 12 should not more than 190 watt
The total value add from port 13 to 24 should not more than 190 watt
There is 30W resvered for PoE chip set

Local Port	PD Class	Power Used [W]	Current Used [mA]	Priority	Port Status	AT/AF Mode
1	4	26.4	510	High	PoE ON	AT
2	4	26.7	515	High	PoE ON	AT
3	4	26.4	510	High	PoE ON	AT
4	4	26.6	512	High	PoE ON	AT
5	0	14.2	276	High	PoE ON	AF
6	0	11.3	218	High	PoE ON	AT
7	0	11.4	220	High	PoE ON	AT
8	0	11.3	219	High	PoE ON	AT
9	0	11.5	222	High	PoE ON	AF
10	0	11.3	217	High	PoE ON	AT
11	0	0	0	High	PoE Search	--
12	0	0	0	High	PoE Search	--
13	0	11.6	222	High	PoE ON	AT
14	0	11.7	225	High	PoE ON	AT
15	0	17	321	High	PoE ON	AT
16	0	18.3	351	High	PoE ON	AF
17	0	17.5	335	High	PoE ON	AT
18	0	18.3	351	High	PoE ON	AT
19	0	0	0	High	PoE Search	--
20	0	0	0	High	PoE Search	--
21	0	0	0	High	PoE Search	--
22	0	0	0	High	PoE Search	--
23	0	0	0	High	PoE Search	--
24	0	0	0	High	PoE Search	--
Total		271.6 [W]	5219 [mA]			

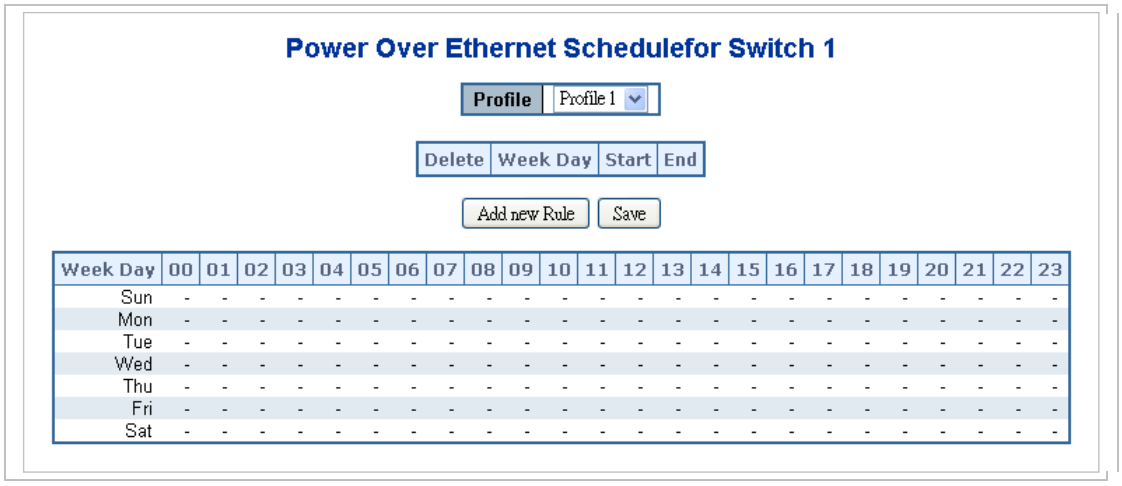
The page includes the following fields:

Object	Description
Current Power Consumption	Show the total watts usage of PoE Switch.
Total Power Reserved	Shows how much the total power be reserved for all PDs.
PoE Temperature Unit 1	Display the current operating temperature of PoE chip unit 1. The unit 1 is in charge of PoE Port-1~Port-12
PoE Temperature Unit 2	Display the current operating temperature of PoE chip unit 2. The unit 1 is in charge of PoE Port-13~Port-24
Local Port	This is the logical port number for this row.
PD Class	Display the class of the PD attached to the port, as established by the classification process. Class 0 is the default for PDs. The PD is classified based on power. The classification of the PD is the maximum power that the PD will draw across all input voltages and operational modes. A PD shall return Class 0 to 3 in accordance with the maximum power draw as specified by Table 4-16-1.
Power Used [W]	The Power Used shows how much power the PD currently is using.
Current Used [mA]	The Power Used shows how much current the PD currently is using.
Priority	The Priority shows the port's priority configured by the user.
Port Status	The Port Status shows the port's status.
AT / AF Mode	Display the current PoE mode
Total	Show the total watts usage of all PDs.

Console: PoE Status	
Description	Show PoE status.
Syntax	`poe status`

4.15.4 PoE Schedule

This page allows the user to define PoE schedule.



The page includes the following fields:

Object	Description
Profile	Set the schedule profile mode. Possible profiles are: • Profile1 • Profile2 • Profile3 • Profile4
Week Day	Show the PoE schedule mode usage of week day.

Buttons

Add new Rule: click to add new rule.

Delete: Check to delete the entry.

4.15.5 LLDP Neighbour Power Over Ethernet

This page provides a status overview for all LLDP PoE neighbours. The displayed table contains a row for each port on which an LLDP PoE neighbour is detected.

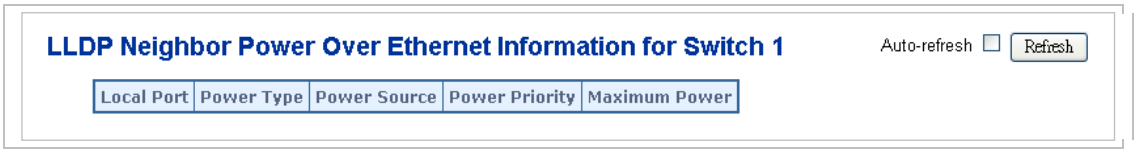


Figure 4-12 *- LLDP Neighbour Power Over Ethernet settings for a switch*

The page includes the following fields:

Object	Description
Local Port	The port for this switch on which the LLDP frame was received.
Type	The Type represents whether the device is a Power Sourcing Entity (PSE) or Power Device (PD). If unknown, "Reserved" will appear.
Source	The power source being utilized by a PSE or PD device. If the device is a PSE device it can either run on its Primary Power Source or its Backup Power Source. If indeterminate, "Unknown" will appear.
Priority	Priority of the PD device or the power priority of the device's port. There are three levels of power priority. The three levels are: Critical, High and Low. If indeterminate, "Unknown" will appear.
Power	The maximum power in watts required by a PD device, or the minimum power a PSE device is capable of sourcing over a maximum length cable based on its current configuration. The maximum allowed value is 102.3 W. If the device indicates value higher than 102.3 W, "reserved" will appear

4.16 Stack

Stacking is an administrative method to manage multiple switches by single IP (minimum 2 units.) The SW Switch supports auto stack configuration. The stack is built and the Switch IDs are automatically assigned once the stack cable is connected to the stack port of each SW switch and all units are powered on. It is also easy to add or delete stackable switches to the stack without service interruption.

Using Stacking, it is possible to connect a number of switches together in a stack, which behaves as a single switch as seen from outside the stack. Three types of stack topologies are supported:

- **Chain Stack:**

  A chain of switches with no redundant forwarding paths.

Figure4-13 - *Chain Stack topology*

- **Ring Stack:**

A ring of switches providing redundant forwarding paths.

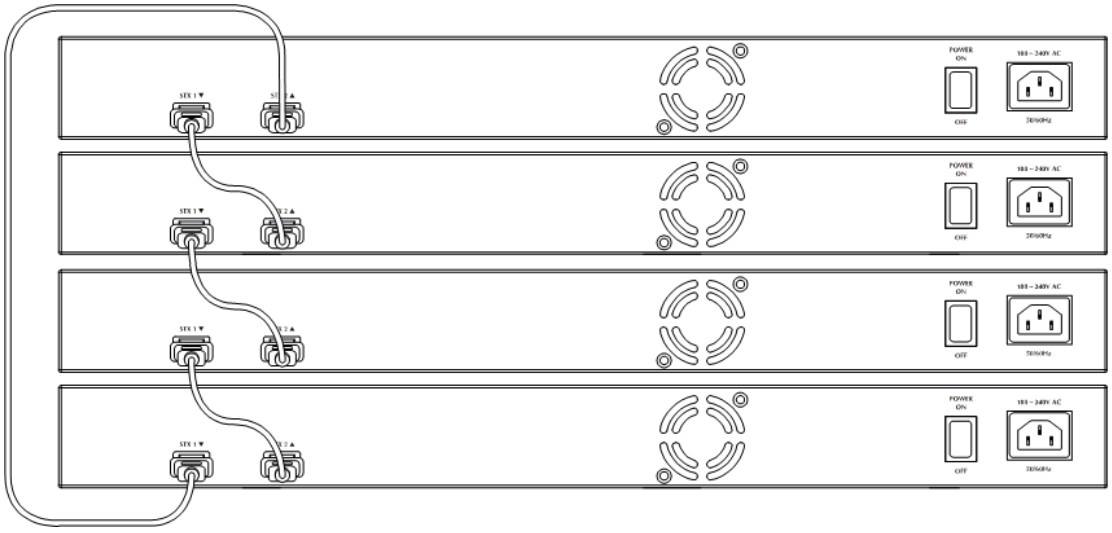


Figure4-14 *- Ring Stack topology*

- **Back-to-Back Stack:**

Two switches interconnected on both stacking ports.

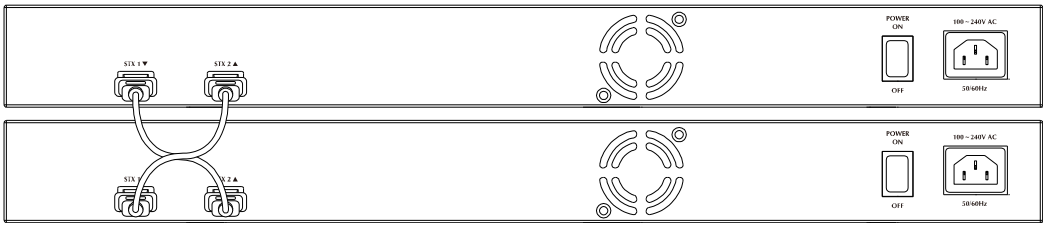


Figure4-15 *- Back to back Stack topology*

Multiple i3 International SW series devices may be connected together to constitute a ring or chain stack topology using the STX / 5Gbps ports as interconnect links. Dedicated stacking features built into the SW series makes all devices in the stack operate together as a single, much larger switch. Each device in the stack is, in a stack context, called a unit. The ports connecting

the units are called stack ports, and the ports connecting to external hosts and switches are called front ports.

4.16.1 Stacking Architecture

This section provides information for understand stacking architecture, include the below items:

- Switch IDs
  - Assigning and Swapping Switch IDs
  - Removing a Switch From the Stack
  - Replacing a Switch
  - General Switch ID Assignment Rules
- Master Election
- Stack Redundancy
- Shortest Path Forwarding

4.16.1.1 Switch IDs

The Switch ID (1-16) assigned to a SW Switch.

➢ **Assigning and Swapping Switch IDs**

When a switch is added to the stack, a Switch ID is automatically assigned to the switch. The automatic SID assignment can be modified by choosing a different Switch ID on the Stack Configuration page. This method allows Switch IDs to be assigned so that it is easier for the user to remember the ID of each switch.

The Switch IDs of two switches can be swapped by simply interchanging the values in the Switch ID column.

Changing Switch IDs does not result in any interruption of the stack operation.

➢ **Removing a Switch From the Stack**

When a switch is removed from the stack, the configuration for the switch is preserved, and the switch still appears on the Stack Configuration page. If the configuration of the switch is not to be transferred to another switch, then the configuration may be deleted by choosing **Delete**, followed by **Save**.

➢ **Replacing a Switch**

If a switch is to be replaced with another switch (for example, replacing failing hardware), the following procedure must be used to assign the configuration of the failing switch to the new hardware:

1. Remove the failing switch from the stack. For example, assume that the failing switch had Switch ID 3.
2. Insert the new switch into the stack. The new switch is assigned an unused Switch ID.
3. To remove the automatic switch ID assignment, choose **Delete**, followed by **Save**. The new switch is then shown with Switch ID set to "-".
4. To assign the configuration of Switch ID 3 to the new hardware, simply choose 3 in the Switch ID column and click **Save**.
5. The new hardware has now taken over the configuration of the failing hardware.

➢ **General Switch ID Assignment Rules**

When assigning Switch IDs to the devices in the stack, you must note the following:

1. Switches with assigned IDs can be changed to use any other switch ID (possibly by swapping Switch ID with another active switch).
2. When swapping two Switch IDs, the devices will retain their (own) configuration, except for the Switch ID.
3. Switches without an assigned Switch ID can only be assigned to any unused ID.
4. When assigning a Switch ID of an inactive switch to a new switch, the new switch will inherit the former's configuration (see "Replacing a Switch" above).
5. Deleting a switch will remove any configuration pertaining to it.
6. Deleting an active switch will leave it with an unassigned Switch ID until rebooted or manually assigning a Switch ID.

4.16.1.2 Master Election

Within a managed stack, one master switch (or just "master") must be elected. Any switch not designated master is a slave switch (or just "slave"). To elect a master, the following criteria are evaluated sequentially:

1. If any switch already claims to have been master for more than 30 seconds, then that switch will become master.
2. If multiple switches claim to have been master for more than 30 seconds, then the switch which has been master for the longest period of time will become master.
3. The switch with the smallest master priority.
4. The switch with the smallest MAC address.

The above algorithm ensures that once a master has been elected and has been master for more than 30 seconds, it will remain master. However in some cases the user may want to enforce a new master election.

On the Stack State Monitor web page, this is shown by "**Re-elect**" being set to "Yes" for one of the switches in the stack.

4.16.1.3 Stack Redundancy

In the unlikely event that a SW Switch fails in a stack, stack integrity is maintained if the redundant cable is connected to the stack. The affected switch within the sack can be replaced or removed without disrupting normal operation. The broken link is bypassed and data transmission continues uninterrupted. The single management IP address for the stack is also preserved for uninterrupted management and monitoring.

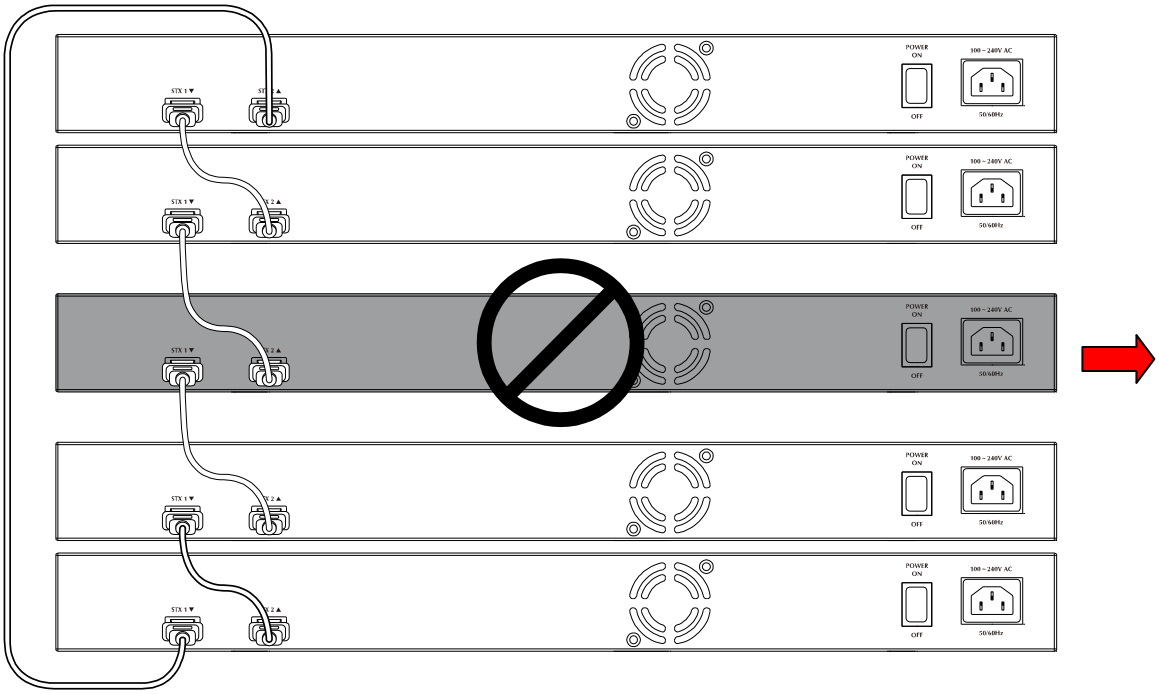


Figure4-16 - *Remove or Replace a switch from the stack*

4.16.1.4 Shortest Path Forwarding

The SW Switch supports shortest path forwarding technology to optimal data flow across the stack. The advantage of shortest path forwarding as below:

- **Automatic Loop Prevention** – Using Time To Live (TTL) information in the stack-header
- **Utilize all stack links in the ring**.

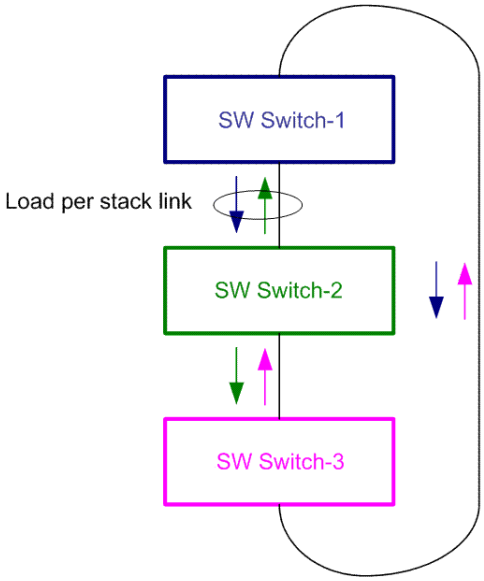
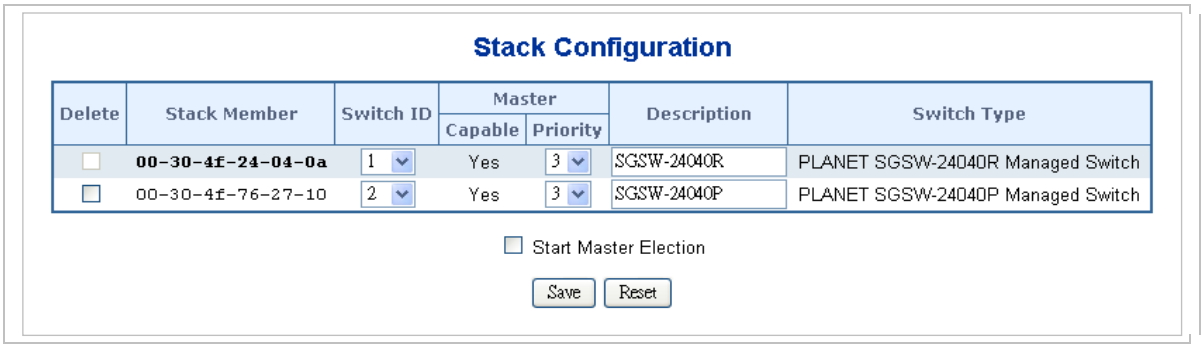


Figure4-17 *– Path forwarding*

4.16.2 Stack Configuration

Configuration settings include assign Switch ID, master priority and display the current stack member information.



The page includes the following fields:

Object	Description
Delete	Deletes this switch from the stack configuration.
Stack Member	The MAC address of the switch.
Switch ID	The Switch ID (1-16) assigned to a switch.
Master Capable	Indicates whether a switch is capable of being master. An unmanaged switch, for example, will not be Master Capable.
Master Priority	The priority that the switch has in the master election process. The smaller the priority, the more likely the switch will become master during the master election process.
Switch Type	The product name of the switch.
Start Master Election	By checking this option, the "Save" operation will also start the master election process. This is done by clicking "Start Master Election", followed by "Save". This causes the first two criteria to be ignored, thereby basing master election only on master priority and MAC address. When master election is enforced, the first two criteria are ignored for a period of 10-15 seconds. Within a managed stack, one master switch (or just "master") must be elected. Any switch not being master is a slave switch (or just "slave").

Console: Stack Select	
Description	Set or show the selected switch ID.
Syntax	`stack select [<sid>|all]`
Parameters	**<*sid*>|all**: Switch ID (1-16) or all switch
Default Setting	Switch ID: All

Example:

Select the switch ID.

```
Switch/>stack select 1
```

Console: Stack SID Assign	
Description	Assign SID and associated configuration to switch. SID must be unassigned and the switch must be present.
Syntax	`stack sid assign <sid> <mac_addr>`
Parameters	**<sid>**: Switch ID (1-16) **<mac_addr>**: MAC address (xx-xx-xx-xx-xx-xx)

Example:

Assign SID 10 for 00-30-4f-24-04-0a

```
Switch/>stack sid assign 10 00-30-4f-24-04-0a
```

Console: Stack SID Swap	
Description	Swap SID values used to identify two switches.
Syntax	`stack sid swap` ***<sid> <sid>***
Parameters	***<sid>***: Switch ID (1-16), default: Show SID

Example:

Change stack SID value.

```
Switch/>stack sid swap 1 2
```

Console: Stack SID Delete	
Description	Delete SID assignment and associated configuration.
Syntax	`stack sid delete` ***<sid>***
Parameters	***<sid>***: Switch ID (1-16)

Example:

Delete stack SID 10.

```
Switch/>stack sid delete 10
```

Console: Stack Master Priority	
Description	Set master election priority
Syntax	`stack master priority` ***<sid>*****|local** ***<mst_elect_prio>***
Parameters	***<sid>*****|local**: Switch ID (1-16) or local switch ***<mst_elect_prio>***: Master election priority: 1-4. 1 => Highest master probability

Example:

Set the master election priority.

```
Switch/>stack master priority 1 1
```

Console: Stack Master Reelect	
Description	Force master reelection (ignoring master time).
Syntax	`stack master re-elect`

Example:

Force master re-election.

```
Switch/>stack master reelect
```

After the Stack Master and Members have been configured, any switch in the stack can be managed from the web agent by choosing the desired Member ID from the Switch drop-down menu.

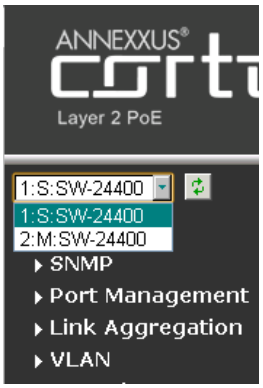


Figure 4-18 - *Managing member switches*

Note

Slave switch IPs will be covered by Masters, and disappear temporarily. The slave IP address can be the same as Master IP address, allowing access to slave switches in case of a Master switch malfunction.

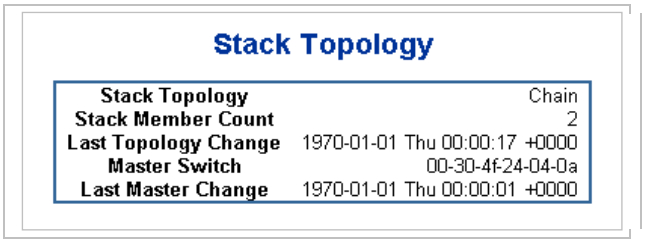
Note

If you have difficulty selecting another switch, you may be connecting to the slave switch's web interface, close the browser window, use the "**arp –d** * " DOS command to clear the ARP table and then reopen the web interface.

4.16.3 Stack Information

This page provides an overview of the stack topology, as detected by SPROUT.

- **Stack Topology**


Stack Topology
Stack Topology Chain
Stack Member Count 2
Last Topology Change 1970-01-01 Thu 00:00:17 +0000
Master Switch 00-30-4f-24-04-0a
Last Master Change 1970-01-01 Thu 00:00:01 +0000

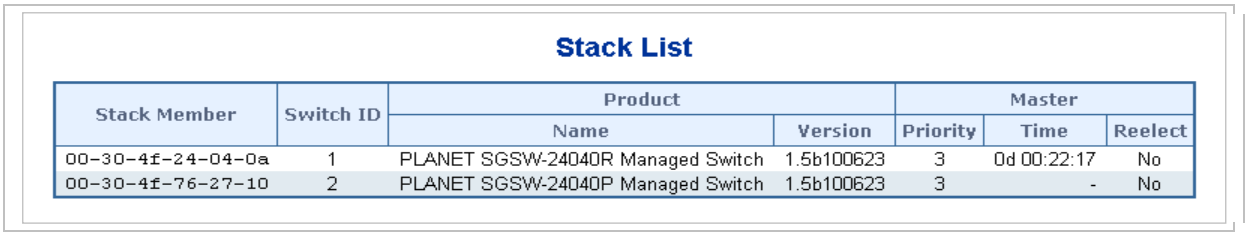
The page includes the following fields:

Object	Description
Stack Topology	Specifies the type of topology for the stack.
Stack Member Count	The number of switches in the stack.
Last Topology Change	The time of the last topology change in the stack.
Master Switch	The MAC address of the current stack master switch.
Last Master Change	The time of the last master change in the stack.

- **Stack List**

For each switch in the stack, the following information is shown: The MAC address, Switch ID, product name and version, and

master re-election state. The master re-election state is normally "No". Only when a forced master re-election is enforced by the user, the master election state takes the value "Yes".



Stack List

Stack Member	Switch ID	Product		Master		
		Name	Version	Priority	Time	Reelect
00-30-4f-24-04-0a	1	PLANET SGSW-24040R Managed Switch	1.5b100623	3	0d 00:22:17	No
00-30-4f-76-27-10	2	PLANET SGSW-24040P Managed Switch	1.5b100623	3	-	No

Console: Stack List	
Description	Show the list of switches in stack.
Syntax	`stack list` **`[detailed|productinfo]`**
Parameters	**detailed|productinfo**: Show product information

Example:

Show the stack list:

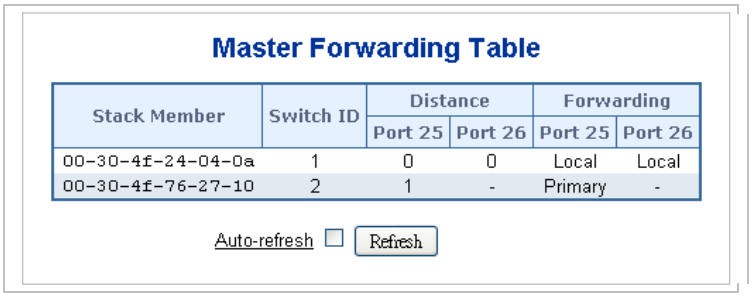
```
Switch/>stack list
                                Distance          Master
Stack Member        SID  Type Port 25  Port 26  Prio      Time    Reelect
------------        ---  ---- -------  -------  ----  --------   -------
*00-30-4f-76-27-10   1   Mgd         0        0     3  00:17:57         0
```

➢ **Master Forwarding Table**

As the heading suggests, the information in the table is as seen from the master view.

For each switch in the stack, the following information is shown:

- The MAC address, switch ID, distance information, and the primary forwarding path to the switch.
- For ring topology, a backup path is also provided.



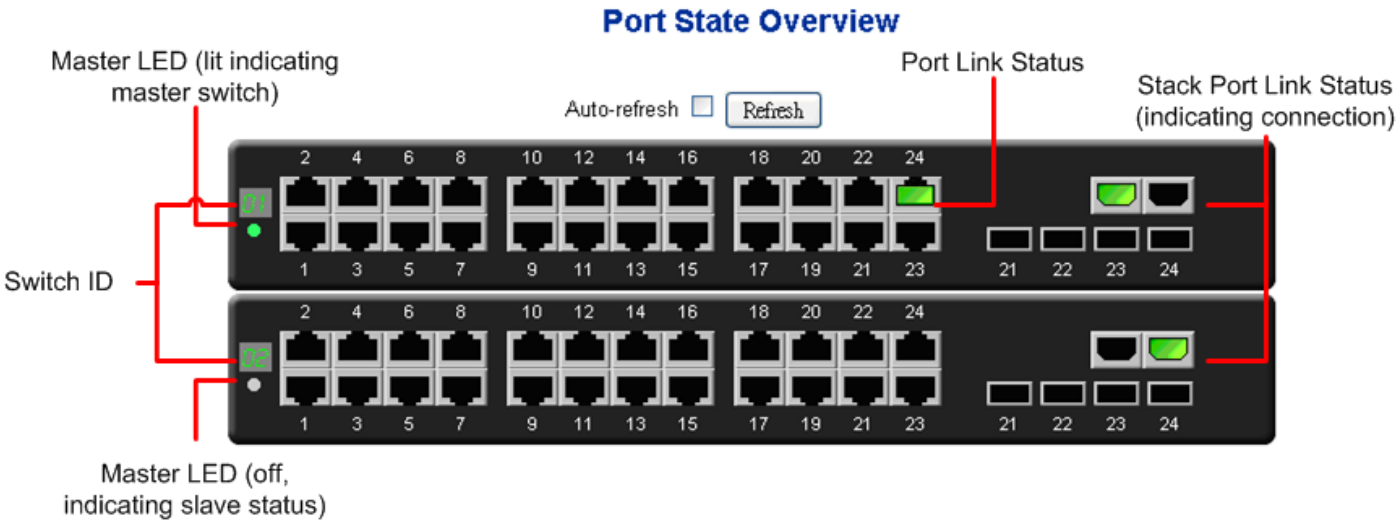
Master Forwarding Table

Stack Member	Switch ID	Distance		Forwarding	
		Port 25	Port 26	Port 25	Port 26
00-30-4f-24-04-0a	1	0	0	Local	Local
00-30-4f-76-27-10	2	1	-	Primary	-

Auto-refresh ☐ Refresh

4.16.4 Stack Port State Overview

This page provides an overview of the current switch port states. Clicking on the image of a port opens the **Port Statistics** page. The port states are illustrated as follows:


Port State Overview
Master LED (lit indicating master switch)
Port Link Status
Stack Port Link Status (indicating connection)
Auto-refresh
Refresh
Switch ID
01
02
2 4 6 8 10 12 14 16 18 20 22 24
1 3 5 7 9 11 13 15 17 19 21 23
21 22 23 24
Master LED (off, indicating slave status)

5. ADDITIONAL CONSOLE COMMANDS

Additional console commands not associated with web management pages and specific tasks are here.

Console: Show	
Description	Show configuration overviews
Syntax	`show` **`[acl|aggr|igmp|ip|lacp|lldp|mac|mirror|poe|port|pvlan|qos|snmp|stack|stp|system|vlan]`**
Parameters	**acl**: ACL configuration **aggr**: Aggregation configuration **igmp**: IGMP snooping configuration **ip**: IP configuration **lacp**: LACP configuration **lldp**: LLDP configuration **mac**: MAC address table configuration **mirror**: Mirror configuration **poe**: PoE configuration **port**: Port configuration **pvlan**: Private VLAN configuration **qos**: QoS configuration **snmp**: SMNP configuration **stack**: List of switches in stack **stp**: STP port configuration **system**: System configuration **vlan**: VLAN configuration

6. TROUBLESHOOTING

This chapter contains information to help you solve problems. If the Ethernet Switch is not functioning properly, make sure the Ethernet Switch was set up according to instructions in this manual.

- **The Link LED is not lit**
  - Solution: Check the cable connection and remove duplex mode of the Ethernet Switch

- **Some stations cannot talk to other stations located on the other port**
  - Solution: Please check the VLAN settings, trunk settings, or port enabled / disabled status.

- **Performance is bad**
  - Solution: Check the full duplex status of the Ethernet Switch. If the Ethernet Switch is set to full duplex and the partner is set to half duplex, then the performance will be poor. Please also check the in/out rate of the port.

- **The switch will not connect to a network**
  - Solution:

  1. Check the LNK/ACT LED on the switch
  2. Try another port on the Switch
  3. Make sure the cable is installed properly
  4. Make sure the cable is the right type
  5. Turn off the power. After a while, turn on power again

- **100Base-TX port link LED is lit, but the traffic is irregular**
  - Solution: Check that the attached device is not set to dedicate full duplex. Some devices use a physical or software switch to change duplex modes. Auto-negotiation may not recognize this type of full-duplex setting.

- **Switch does not power up**
  - Solution:

  6. AC power cord not inserted or faulty
  7. Check that the AC power cord is inserted correctly
  8. Replace the power cord If the cord is inserted correctly, check that the AC power source is working by connecting a different device in place of the switch.
  9. If that device works, refer to the next step.
  10. If that device does not work, check the AC power

- **Lost admin password**
  - Solution: To reset the IP address to the default IP Address "192.0.0.20" or reset the password to default value. Press the hardware **reset button** at the front panel about **10 seconds.**

APPENDIX A. SWITCH FEATURE OPERATION

A.1 Address Table and Learning

The Switch is implemented with an address table composed of many entries. Each entry is used to store the address information of some node in the network. When a packet comes in from a port, the switch will record the source address, port number and other related information in an address table to be used for deciding to either forward or filter future packets. This process is known as Learning.

A.2 Forwarding and Filtering

When a packet comes from a port of the switch, it will also check the destination address as well as the source address for learning. If the address table for the destination address not found, this packet will be forwarded to all the other ports except the port sending the packet. These ports will transmit this packet to the connected network. If found and the destination address is located at different port than the sending packet, the switch will forward this packet to the port where this destination address is located according to the information from address table. If the destination address is located at the same port sending the packet, then this packet will be filtered, thereby increasing network throughput and availability

A.3 Store-and-Forward

Store-and-Forward is one type of packet-forwarding technique. A Store-and-Forward Ethernet switch stores the incoming frame in an internal buffer; complete error checking is done before transmission to eliminate the occurrence of error packets. This is the best choice when a network efficiency and stability are a priority.

The switch scans the destination address from the packet-header, searches the routing table provided for the incoming port and forwards the packet, only if required. The fast forwarding makes the switch ideal for connecting servers directly to the network, thereby increasing throughput and availability. However, the switch is most commonly used to segment existing hubs, which nearly always improves overall performance. An Ethernet switch can be easily configured in any network environment to significantly boost bandwidth using conventional cabling and adapters.

Due to the learning function of the switch, the source address and corresponding port number of each incoming and outgoing packet are stored in a routing table. This information is subsequently used to filter packets whose destination address is on the same segment as the source address. This confines network traffic to its respective domain and reduce the overall load on the network.

The Switch performs "Store and forward" therefore, no error packets occur. More reliably, it reduces the rate of re-transmissions. No packet loss will occur.

A.4 Auto-Negotiation

The STP ports on the Switch have built-in "Auto-negotiation". This technology automatically sets the best possible bandwidth when a connection is established with another network device (usually at Power On or Reset). This is done by detecting the modes and speeds both connected devices are capable of. Both 10Base-T and 100Base-TX devices can connect with the port in either Half- or Full-Duplex mode.

If attached device is:	100Base-TX port will set to:
10Mbps, no auto-negotiation	10Mbps.
10Mbps, with auto-negotiation	10/20Mbps (10Base-T/Full-Duplex)
100Mbps, no auto-negotiation	100Mbps
100Mbps, with auto-negotiation	100/200Mbps (100Base-TX/Full-Duplex)

APPENDIX B. POWER OVER ETHERNET OVERVIEW

B.1. PoE Introduction

IEEE802.3af, also called Data Terminal equipment (DTE) power via Media dependent interface (MDI), is an international standard which defines the transmission for power over Ethernet. 802.3af delivers 48V power over RJ-45 wiring. Besides 802.3af, two types of source equipment are defined: Mid-Span and End-Span.

- **Mid-Span**

A Mid-Span device is placed between a legacy switch and the powered device. Mid-Span taps unused wire pairs 4/5 and 7/8 to carry power. The other four are reserved for data transmission.

- **End-Span**

An End-Span device connects directly with a power device. End-Span devices can also tap the 1/2 and 3/6 wire pairs.

B.2. PoE System Architecture

The specification of PoE typically requires two devices: the Powered Source Equipment (PSE) and the Powered Device (PD). The PSE is either an End-Span or a Mid-Span, while the PD is a PoE-enabled terminal, such as IP Phones, Wireless LAN, etc. Power can be delivered over data pairs or spare pairs of standard CAT-5 cabling.

B.2.1. Power Transference through a CAT5 Ethernet cable

A standard CAT5 Ethernet cable has four twisted pairs, but only two of these are used for 10BASE-T and 100BASE-T specifications. The specification allows two options for using these cables for power, shown in Figure 8-1 and Figure 8-2: The spare pairs are being used in these diagrams; Figure 8-1 shows the pair on pins 4 and 5 connected together, forming a positive supply and the pair on pins 7 and 8 connected, forming a negative supply. In actual use, either polarity may be used for power transference.

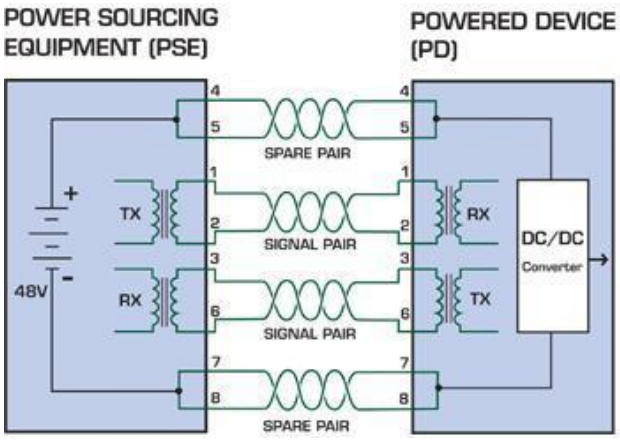


Figure B-1 *- Power Supplied over the Spare Pins*

The data pairs are used. Since Ethernet pairs are transformer coupled at each end, DC power may be applied to the center tap of the isolation transformer without upsetting the data transfer. In this mode of operation the pair on pins 3 and 6 and the pair on pins 1 and 2 can be of either polarity.

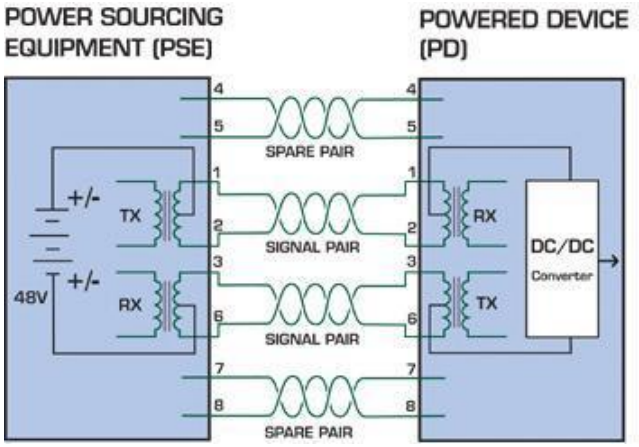


Figure B-2 *- Power Supplied over the Data Pins*

B.3. PoE Provisioning Process

Despite the fact that adding PoE support to network devices is a relatively simple operation, read this section carefully and understand this process before attempting to initialize such a network in order to minimize the risk of damage to hardware not designed for network-based power provisioning.

The PSE is a device that manages the power flow over an Ethernet cable. During the detection period, a small voltage level is induced on the port's output until a PD is detected. The PSE may choose to perform classification; to estimate the amount of power to be consumed by this PD. After a timed start-up, the PSE begins supplying the 48 VDC level to the PD, till it is physically or electrically disconnected, during which voltage and power will shut down.

Since the PSE is responsible for the PoE process timing, it is the one generating the probing signals prior to operating the PD and monitoring the various scenarios that may occur during operation. All probing is done using voltage induction and current measurement in return.

Stage	Action	Volts specified per 802.3af	Volts managed by chipset
Detection	Measure whether powered device has the correct signature resistance of 15–33 kΩ	2.7-10.0	1.8–10.0
Classification	Measure which power level class the resistor indicates	14.5-20.5	12.5–25.0
Startup	Where the powered device will startup	>42	>38
Normal operation	Supply power to device	36-57	25.0–60.0

B.3.1. Line Detection

Before power is applied, for safety reasons a valid PD is connected to the PSE's output first. This process is referred to as "line

detection", and involves the PSE seeking a specific 25 KΩ signature resistor. Detection of this signature indicates that a valid PD is connected, and that provision of power to the device may commence. The signature resistor is isolated in the PD's PoE front-end, away from the rest of the PD's circuitries till detection is certified.

B.3.2. Classification

Once a PD is detected, the PSE may optionally perform classification to determine the maximal power a PD is to consume. The PSE induces 15.5-20.5 VDC, limited to 100 mA, for a period of 10 to 75 ms responded by a certain current consumption by the PD, indicating its power class.

The PD is assigned to one of 5 classes: 0 (default class) indicates that full 15.4 watts should be provided, 1-3 indicate various required power levels and 4 is reserved for future use. PDs that do not support classification are assigned class 0. Special care must be employed in the definition of class thresholds, as classification may be affected by cable losses.

Classifying a PD according to its power consumption ideally helps a PoE system in optimizing its power distribution, so that efficient power management based on classification results may reduce total system costs.

B.3.3. Start-up

Once line detection and optional classification stages are completed, the PSE must switch from low voltage to its full voltage capacity (44-57 Volts) over a minimal amount of time (above 15 microseconds). A gradual startup is required to avoid a sudden rise in voltage (reaching high frequencies) would introduce noise on the data lines. Once provision of power is initiated, it is common for an inrush current to be experienced at the PSE port, due to the PD's input capacitance. A PD must be designed to cease inrush current consumption (of over 350 mA) within 50 ms of power provision startup.

B.3.4. Operation

During normal operation, the PSE provides 44-57 VDC, able to support a minimum of 15.4 watts power.

B.3.5. Power Overloads

The IEEE 802.3af standard defines the handling of overload conditions. In the event of an overload (a PD drawing a higher power level than the allowed 12.95 Watts), or an outright short circuit caused by a failure in cabling or in the PD, the PSE must shut down power within 50 to 75 milliseconds, while limiting current drain during this period to protect the cabling infrastructure. Immediate voltage drop is avoided to prevent shutdown due to random fluctuations.

APPENDEX C: ETHERNET STANDARDS

C.1 Switch's RJ-45 Pin Assignments

1000Mbps, 1000Base T pin assignment

Contact	MDI	MDI-X
1	BI_DA+	BI_DB+
2	BI_DA-	BI_DB-
3	BI_DB+	BI_DA+
4	BI_DC+	BI_DD+
5	BI_DC-	BI_DD-
6	BI_DB-	BI_DA-
7	BI_DD+	BI_DC+
8	BI_DD-	BI_DC-

Implicit implementation of the crossover function within a twisted-pair cable, or at a wiring panel, while not expressly forbidden, is beyond the scope of this standard.

C.2 10/100Mbps, 10/100Base-TX

When connecting your 10/100Mbps Ethernet Switch to another switch, a bridge or a hub, a straight or crossover cable is necessary. Each port of the Switch supports auto-MDI/MDI-X detection. That means you can directly connect the Switch to any Ethernet devices without making a crossover cable. The following table and diagram show the standard RJ-45 receptacle/ connector and their pin assignments:

RJ-45 Connector pin assignment		
Contact	MDI Media Dependant Interface	MDI-X Media Dependant Interface-Cross
1	Tx + (transmit)	Rx + (receive)
2	Tx - (transmit)	Rx - (receive)
3	Rx + (receive)	Tx + (transmit)
4, 5	Not used	
6	Rx - (receive)	Tx - (transmit)
7, 8	Not used	

The standard cable, RJ-45 pin assignment

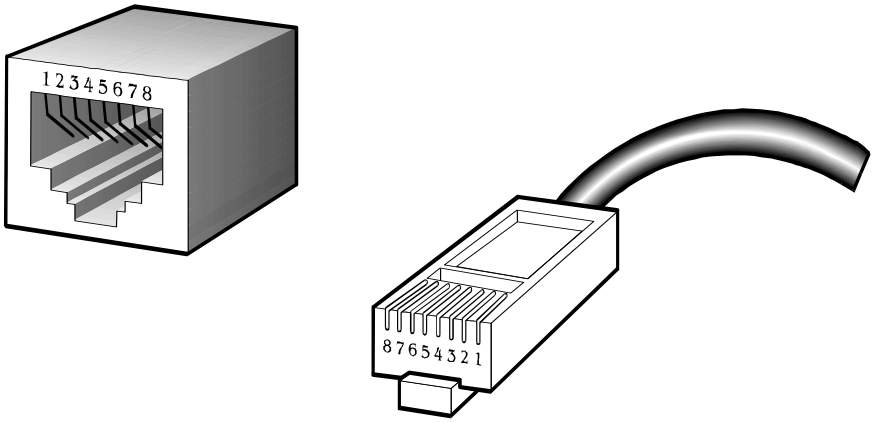


Figure C-1 *- Standard RJ-45 receptacle/connector*

There are 8 wires on a standard UTP/STP cable and each wire is color-coded. The following shows the pin allocation and color of straight cable and crossover cable connection:

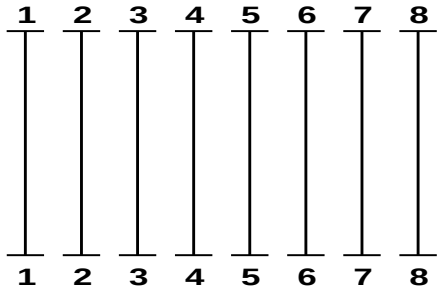
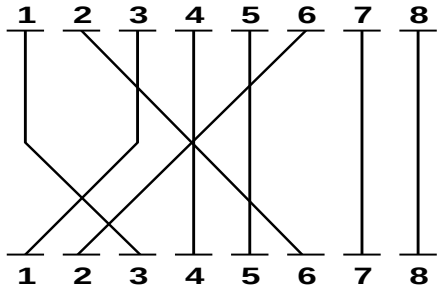
Straight Cable		SIDE 1	SIDE2
	SIDE 1	1 = White / Orange	1 = White / Orange
		2 = Orange	2 = Orange
		3 = White / Green	3 = White / Green
		4 = Blue	4 = Blue
		5 = White / Blue	5 = White / Blue
	SIDE 2	6 = Green	6 = Green
		7 = White / Brown	7 = White / Brown
		8 = Brown	8 = Brown
Crossover Cable		**SIDE 1**	**SIDE2**
	SIDE 1	1 = White / Orange	1 = White / Green
		2 = Orange	2 = Green
		3 = White / Green	3 = White / Orange
		4 = Blue	4 = Blue
		5 = White / Blue	5 = White / Blue
	SIDE 2	6 = Green	6 = Orange
		7 = White / Brown	7 = White / Brown
		8 = Brown	8 = Brown

Figure *- Straight-Through and Crossover Cable*

Please make sure your connected cables are with same pin assignment and color as above picture before deploying the cables into your network.

APPENDEX D: GLOSSARY

A

ACE

ACE is an acronym for **A**ccess **C**ontrol **E**ntry. It describes access permission associated with a particular ACE ID.
There are three ACE frame types (Ethernet Type, ARP, and IPv4) and two ACE actions (permit and deny). The ACE also contains many detailed, different parameter options that are available for individual application.

ACL

ACL is an acronym for **A**ccess **C**ontrol **L**ist. It is the list table of ACEs, containing access control entries that specify individual users or groups permitted or denied to specific traffic objects, such as a process or a program.
Each accessible traffic object contains an identifier to its ACL. The privileges determine whether there are specific traffic object access rights.
ACL implementations can be quite complex, for example, when the ACEs are prioritized for the various situation. In networking, the ACL refers to a list of service ports or network services that are available on a host or server, each with a list of hosts or servers permitted or denied to use the service. ACL can generally be configured to control inbound traffic, and in this context, they are similar to firewalls.
There are 3 web-pages associated with the manual ACL configuration:

ACL|Access Control List: The web page shows the ACEs in a prioritized way, highest (top) to lowest (bottom). Default the table is empty. An ingress frame will only get a hit on one ACE even though there are more matching ACEs. The first matching ACE will take action (permit/deny) on that frame and a counter associated with that ACE is incremented. An ACE can be associated with a Policy, 1 ingress port, or any ingress port (the whole switch). If an ACE Policy is created then that Policy can be associated with a group of ports under the "Ports" web-page. There are number of parameters that can be configured with an ACE. Read the Web page help text to get further information for each of them. The maximum number of ACEs is 64.
ACL|Ports: The ACL Ports configuration is used to assign a Policy ID to an ingress port. This is useful to group ports to obey the same traffic rules. Traffic Policy is created under the "Access Control List" - page. You can you also set up specific traffic properties (Action / Rate Limiter / Port copy, etc) for each ingress port. They will though only apply if the frame gets past the ACE matching without getting matched. In that case a counter associated with that port is incremented. See the Web page help text for each specific port property.
ACL|Rate Limiters: Under this page you can configure the rate limiters. There can be 15 different rate limiters, each ranging from 1-1024K packets per seconds. Under "Ports" and "Access Control List" web-pages you can assign a Rate Limiter ID to the ACE(s) or ingress port(s).

ARP

ARP is an acronym for **A**ddress **R**esolution **P**rotocol. It is a protocol that used to convert an IP address into a physical address, such as an Ethernet address. ARP allows a host to communicate with other hosts when only the Internet address of its neighbours is known. Before using IP, the host sends a broadcast ARP request containing the Internet address of the

desired destination system.

ARP Inspection

ARP Inspection is a secure feature. Several types of attacks can be launched against a host or devices connected to Layer 2 networks by "poisoning" the ARP caches. This feature is used to block such attacks. Only valid ARP requests and responses can go through the switch device.

Auto-Negotiation

Auto-negotiation is the process where two different devices establish the mode of operation and the speed settings that can be shared by those devices for a link.

C

CDP

CDP is an acronym for **C**isco **D**iscovery **P**rotocol.

D

DES

DES is an acronym for **D**ata **E**ncryption **S**tandard. It provides a complete description of a mathematical algorithm for encrypting (enciphering) and decrypting (deciphering) binary coded information.
Encrypting data converts it to an unintelligible form called cipher. Decrypting cipher converts the data back to its original form called plaintext. The algorithm described in this standard specifies both enciphering and deciphering operations which are based on a binary number called a key.

DHCP

DHCP is an acronym for **D**ynamic **H**ost **C**onfiguration **P**rotocol. It is a protocol used for assigning dynamic IP addresses to devices on a network.
DHCP used by networked computers (clients) to obtain IP addresses and other parameters such as the default gateway, subnet mask, and IP addresses of DNS servers from a DHCP server.
The DHCP server ensures that all IP addresses are unique, for example, no IP address is assigned to a second client while the first client's assignment is valid (its lease has not expired). Therefore, IP address pool management is done by the server and not by a human network administrator.
Dynamic addressing simplifies network administration because the software keeps track of IP addresses rather than requiring an administrator to manage the task. This means that a new computer can be added to a network without the hassle of manually assigning it a unique IP address.

DHCP Relay

DHCP Relay is used to forward and to transfer DHCP messages between the clients and the server when they are not on the same subnet domain.
The DHCP option 82 enables a DHCP relay agent to insert specific information into a DHCP request packets when forwarding client DHCP packets to a DHCP server and remove the specific information from a DHCP reply packets when forwarding server DHCP packets to a DHCP client. The DHCP server can use this information to implement IP address or other assignment policies. Specifically the option works by setting two sub-options: Circuit ID (option 1) and Remote ID

(option2). The Circuit ID sub-option is supposed to include information specific to which circuit the request came in on. The Remote ID sub-option was designed to carry information relating to the remote host end of the circuit.
The definition of Circuit ID in the switch is 4 bytes in length and the format is "vlan_id" "module_id" "port_no". The parameter of "vlan_id" is the first two bytes represent the VLAN ID. The parameter of "module_id" is the third byte for the module ID (in standalone switch it always equal 0, in stackable switch it means switch ID). The parameter of "port_no" is the fourth byte and it means the port number.
The Remote ID is 6 bytes in length, and the value is equal the DHCP relay agents MAC address.

DHCP Snooping

DHCP Snooping is used to block intruder on the untrusted ports of the switch device when it tries to intervene by injecting a bogus DHCP reply packet to a legitimate conversation between the DHCP client and server.

DNS

DNS is an acronym for **D**omain **N**ame **S**ystem. It stores and associates many types of information with domain names. Most importantly, DNS translates human-friendly domain names and computer hostnames into computer-friendly IP addresses. For example, the domain name www.example.com might translate to 192.168.0.1.

DoS

DoS is an acronym for **D**enial of **S**ervice. In a denial-of-service (DoS) attack, an attacker attempts to prevent legitimate users from accessing information or services. By targeting at network sites or network connection, an attacker may be able to prevent network users from accessing email, web sites, online accounts (banking, etc.), or other services that rely on the affected computer.

Dotted-Decimal Notation

Dotted Decimal Notation refers to a method of writing IP addresses using decimal numbers and dots as separators between octets.
An IPv4 dotted decimal address has the form x.y.z.w, where x, y, z, and w are decimal numbers between 0 and 255.

DSCP

DSCP is an acronym for **D**ifferentiated **S**ervices **C**ode **P**oint. It is a field in the header of IP packets for packet classification purposes.

E

Ethernet Type

Ethernet Type, or EtherType, is a field in the Ethernet MAC header, defined by the Ethernet networking standard. It is used to indicate which protocol is being transported in an Ethernet frame.

F

FTP

FTP is an acronym for **F**ile **T**ransfer **P**rotocol. It is a transfer protocol that uses the Transmission Control Protocol (TCP) and provides file writing and reading. It also provides directory service and security features.

Fast Leave

IGMP snooping Fast Leave processing allows the switch to remove an interface from the forwarding-table entry without first sending out group specific queries to the interface. The VLAN interface is pruned from the multicast tree for the multicast group specified in the original leave message. Fast-leave processing ensures optimal bandwidth management for all hosts on a switched network, even when multiple multicast groups are in use simultaneously.

I

ICMP

ICMP is an acronym for **I**nternet **C**ontrol **M**essage **P**rotocol. It is a protocol that generated the error response, diagnostic or routing purposes. ICMP messages generally contain information about routing difficulties or simple exchanges such as time-stamp or echo transactions. For example, the PING command uses ICMP to test an Internet connection.

IEEE 802.1X

IEEE 802.1X is an IEEE standard for port-based Network Access Control. It provides authentication to devices attached to a LAN port, establishing a point-to-point connection or preventing access from that port if authentication fails. With 802.1X, access to all switch ports can be centrally controlled from a server, which means that authorized users can use the same credentials for authentication from any point within the network.

IGMP

IGMP is an acronym for **I**nternet **G**roup **M**anagement **P**rotocol. It is a communications protocol used to manage the membership of Internet Protocol multicast groups. IGMP is used by IP hosts and adjacent multicast routers to establish multicast group memberships. It is an integral part of the IP multicast specification, like ICMP for unicast connections. IGMP can be used for online video and gaming, and allows more efficient use of resources when supporting these uses.

IGMP Querier

A router sends IGMP Query messages onto a particular link. This router is called the Querier.

IP Source Guard

IP Source Guard is a secure feature used to restrict IP traffic on DHCP snooping untrusted ports by filtering traffic based on the DHCP Snooping Table or manually configured IP Source Bindings. It helps prevent IP spoofing attacks when a host tries to spoof and use the IP address of another host.

IPv6 Address

IPv6 addresses are in the form of 128-bit records represented as eight fields of up to four hexadecimal digits with a colon separating each field (:). 'fe80::215:c5ff:fe03:4dc7' is an example of an IPv6 address. The symbol '::' is used as a shorthand way of representing multiple 16-bit groups of contiguous zeros; but it can only appear once. It is also used heading a legal IPv4 address. For example, '::192.1.2.34'.

L

LACP

LACP is an IEEE 802.3ad standard protocol. The **L**ink **A**ggregation **C**ontrol **P**rotocol, allows bundling several physical ports together to form a single logical port.

LLDP

LLDP is an IEEE 802.1ab standard protocol.

The **L**ink **L**ayer **D**iscovery **P**rotocol(LLDP) specified in this standard allows stations attached to an IEEE 802 LAN to advertise, to other stations attached to the same IEEE 802 LAN, the major capabilities provided by the system incorporating that station, the management address or addresses of the entity or entities that provide management of those capabilities, and the identification of the stations point of attachment to the IEEE 802 LAN required by those management entity or entities. The information distributed via this protocol is stored by its recipients in a standard Management Information Base (MIB), making it possible for the information to be accessed by a Network Management System (NMS) using a management protocol such as the Simple Network Management Protocol (SNMP).

LLDP-MED

LLDP-MED is an extension of IEEE 802.1ab and is defined by the telecommunication industry association (TIA-1057).

M

MAC Table

Switching of frames is based upon the DMAC address contained in the frame. The switch builds up a table that maps MAC addresses to switch ports for knowing which ports the frames should go to (based upon the DMAC address in the frame). This table contains both static and dynamic entries. The static entries are configured by the network administrator if the administrator wants to do a fixed mapping between the DMAC address and switch ports.

The frames also contain a MAC address (SMAC address), which shows the MAC address of the equipment sending the frame. The SMAC address is used by the switch to automatically update the MAC table with these dynamic MAC addresses. Dynamic entries are removed from the MAC table if no frame with the corresponding SMAC address have been seen after a configurable age time.

MD5

MD5 is an acronym for **M**essage-**D**igest algorithm **5**. MD5 is a message digest algorithm, used cryptographic hash function with a 128-bit hash value. It was designed by Ron Rivest in 1991. MD5 is officially defined in RFC 1321 - The MD5 Message-Digest Algorithm.

Mirroring

For debugging network problems or monitoring network traffic, the switch system can be configured to mirror frames from multiple ports to a mirror port. (In this context, mirroring a frame is the same as copying the frame.)

Both incoming (source) and outgoing (destination) frames can be mirrored to the mirror port.

N

NAS

NAS is an acronym for Network Access Server. The NAS is meant to act as a gateway to guard access to a protected source. A client connects to the NAS, and the NAS connects to another resource asking whether the client's supplied credentials are valid. Based on the answer, the NAS then allows or disallows access to the protected resource. An example of a NAS implementation is IEEE 802.1X.

NTP

NTP is an acronym for **N**etwork **T**ime **P**rotocol, a network protocol for synchronizing the clocks of computer systems. NTP uses UDP (datagrams) as transport layer. NTP Servers can be specified and GMT Time zones may be set.

O

Optional TLVs.

A LLDP frame contains multiple TLVs

For some TLVs it is configurable if the switch shall include the TLV in the LLDP frame. These TLVs are known as optional TLVs. If an optional TLVs is disabled the corresponding information is not included in the LLDP frame.

OUI

OUI is the organizationally unique identifier. An OUI address is a globally unique identifier assigned to a vendor by IEEE. You can determine which vendor a device belongs to according to the OUI address which forms the first 24 bits of a MAC address.

P

PD

PD is an acronym for **P**owered **D**evice. In a PoE> system the power is delivered from a PSE (power sourcing equipment) to a remote device. The remote device is called a PD.

PHY

PHY is an abbreviation for Physical Interface Transceiver and is the device that implement the Ethernet physical layer (IEEE-802.3).

Policer

A policer can limit the bandwidth of received frames. It is located in front of the ingress queue.

PPPoE

PPPoE is an acronym for Point-to-Point Protocol over Ethernet.

It is a network protocol for encapsulating Point-to-Point Protocol (PPP) frames inside Ethernet frames. It is used mainly with ADSL services where individual users connect to the ADSL transceiver (modem) over Ethernet and in plain Metro Ethernet networks (Wikipedia).

Q

QCE

QCE is an acronym for **Q**oS **C**ontrol **E**ntry. It describes QoS class associated with a particular QCE ID.

There are six QCE frame types: Ethernet Type, VLAN, UDP/TCP Port, DSCP, TOS, and Tag Priority. Frames can be classified by one of 4 different QoS classes: "Low", "Normal", "Medium", and "High" for individual application.

QCL

QCL is an acronym for **Q**oS **C**ontrol **L**ist. It is the list table of QCEs, containing QoS control entries that classify to a specific QoS class on specific traffic objects.

Each accessible traffic object contains an identifier to its QCL. The privileges determine specific traffic object to specific QoS class.

Q-in-Q Tunneling

IEEE 802.1Q Tunneling (QinQ) is designed for service providers carrying traffic for multiple customers across their networks. QinQ tunneling is used to maintain customer-specific VLAN and Layer 2 protocol configurations even when different customers use the same internal VLAN IDs. This is accomplished by inserting Service Provider VLAN (SPVLAN) tags into the customer's frames when they enter the service provider's network, and then stripping the tags when the frames leave the network.

QoS

QoS is an acronym for **Q**uality **o**f **S**ervice. It is a method to guarantee a bandwidth relationship between individual applications or protocols.

A communications network transports a multitude of applications and data, including high-quality video and delay-sensitive data such as real-time voice. Networks must provide secure, predictable, measurable, and sometimes guaranteed services.

Achieving the required QoS becomes the secret to a successful end-to-end business solution. Therefore, QoS is the set of techniques to manage network resources.

R

RARP

RARP is an acronym for **R**everse **A**ddress **R**esolution **P**rotocol. It is a protocol that is used to obtain an IP address for a given hardware address, such as an Ethernet address. RARP is the complement of ARP.

RADIUS

RADIUS is an acronym for **Re**mote **A**uthentication **D**ial In **U**ser **S**ervice. It is a networking protocol that provides centralized access, authorization and accounting management for people or computers to connect and use a network service.

RSTP

In 1998, the IEEE with document 802.1w introduced an evolution of STP: the **R**apid **S**panning **T**ree **P**rotocol, which provides for faster spanning tree convergence after a topology change. Standard IEEE 802.1D-2004 now incorporates RSTP and obsoletes STP, while at the same time being backwards-compatible with STP.

S

SHA

SHA is an acronym for **S**ecure **H**ash **A**lgorithm. It designed by the National Security Agency (NSA) and published by the NIST as a U.S. Federal Information Processing Standard. Hash algorithms compute a fixed-length digital representation (known as a message digest) of an input data sequence (the message) of any length.

Shaper

A shaper can limit the bandwidth of transmitted frames. It is located after the ingress queues.

SNMP

SNMP is an acronym for **S**imple **N**etwork **M**anagement **P**rotocol. It is part of the Transmission Control Protocol/Internet

Protocol (TCP/IP) protocol for network management. SNMP allow diverse network objects to participate in a network management architecture. It enables network management systems to learn network problems by receiving traps or change notices from network devices implementing SNMP.

An SNMP community is the group that devices and management stations running SNMP belong to. It helps define where information is sent. The community name is used to identify the group. A SNMP device or agent may belong to more than one SNMP community. It will not respond to requests from management stations that do not belong to one of its communities. SNMP default communities are:

SNTP

SNTP is an acronym for **S**imple **N**etwork **T**ime **P**rotocol, a network protocol for synchronizing the clocks of computer systems. SNTP uses UDP (datagrams) as transport layer.

SPROUT

Stack **P**rotocol using **ROU**ting **T**echnology. An advanced protocol for almost instantaneous discovery of topology changes within a stack as well as election of a master switch. SPROUT also calculates parameters for setting up each switch to perform shortest path forwarding within the stack.

SSID

Service **S**et **Id**entifier is a name used to identify the particular 802.11 wireless LANs to which a user wants to attach. A client device will receive broadcast messages from all access points within range advertising their SSIDs, and can choose one to connect to based on pre-configuration, or by displaying a list of SSIDs in range and asking the user to select one (Wikipedia).

SSH

SSH is an acronym for **S**ecure **SH**ell. It is a network protocol that allows data to be exchanged using a secure channel between two networked devices. The encryption used by SSH provides confidentiality and integrity of data over an insecure network. The goal of SSH was to replace the earlier rlogin, TELNET and rsh protocols, which did not provide strong authentication or guarantee confidentiality (Wikipedia).

T

TACACS+

TACACS+ is an acronym for **T**erminal **A**ccess **C**ontroller **A**ccess **C**ontrol **S**ystem **P**lus. It is a networking protocol which provides access control for routers, network access servers and other networked computing devices via one or more centralized servers. TACACS+ provides separate authentication, authorization and accounting services.

TCP

TCP is an acronym for **T**ransmission **C**ontrol **P**rotocol. It is a communications protocol that uses the Internet Protocol (IP) to exchange the messages between computers.

The TCP protocol guarantees reliable and in-order delivery of data from sender to receiver and distinguishes data for multiple connections by concurrent applications (for example, Web server and e-mail server) running on the same host. The applications on networked hosts can use TCP to create connections to one another. It is known as a connection-

oriented protocol, which means that a connection is established and maintained until such time as the message or messages to be exchanged by the application programs at each end have been exchanged. TCP is responsible for ensuring that a message is divided into the packets that IP manages and for reassembling the packets back into the complete message at the other end.

Common network applications that use TCP include the World Wide Web (WWW), e-mail, and File Transfer Protocol (FTP).

TELNET

TELNET is an acronym for **TEL**etype **NET**work. It is a terminal emulation protocol that uses the Transmission Control Protocol (TCP) and provides a virtual connection between TELNET server and TELNET client.

TELNET enables the client to control the server and communicate with other servers on the network. To start a Telnet session, the client user must log in to a server by entering a valid username and password. Then, the client user can enter commands through the Telnet program just as if they were entering commands directly on the server console.

TFTP

TFTP is an acronym for **T**rivial **F**ile **T**ransfer **P**rotocol. It is transfer protocol that uses the User Datagram Protocol (UDP) and provides file writing and reading, but it does not provides directory service and security features.

ToS

ToS is an acronym for **T**ype **o**f **S**ervice. It is implemented as the IPv4 ToS priority control. It is fully decoded to determine the priority from the 6-bit ToS field in the IP header. The most significant 6 bits of the ToS field are fully decoded into 64 possibilities, and the singular code that results is compared against the corresponding bit in the IPv4 ToS priority control bit (0~63).

TLV

TLV is an acronym for **T**ype **L**ength **V**alue. A LLDP frame can contain multiple pieces of information. Each of these pieces of information is known as TLV.

U

UDP

UDP is an acronym for **U**ser **D**atagram **P**rotocol. It is a communications protocol that uses the Internet Protocol (IP) to exchange the messages between computers.

UDP is an alternative to the Transmission Control Protocol (TCP) that uses the Internet Protocol (IP). Unlike TCP, UDP does not provide the service of dividing a message into packet datagrams, and UDP doesn't provide reassembling and sequencing of the packets. This means that the application program that uses UDP must be able to make sure that the entire message has arrived and is in the right order. Network applications that want to save processing time because they have very small data units to exchange may prefer UDP to TCP.

UDP provides two services not provided by the IP layer. It provides port numbers to help distinguish different user requests and, optionally, a checksum capability to verify that the data arrived intact.

Common network applications that use UDP include the Domain Name System (DNS), streaming media applications such as IPTV, Voice over IP (VoIP), and Trivial File Transfer Protocol (TFTP).

UPnP

UPnP is an acronym for **U**niversal **P**lug and **P**lay. The goals of UPnP are to allow devices to connect seamlessly and to simplify the implementation of networks in the home (data sharing, communications, and entertainment) and in corporate environments for simplified installation of computer components

User Priority

User Priority is a 3-bit field storing the priority level for the 802.1Q frame.

V

VLAN

Virtual LAN. A method to restrict communication between switch ports. VLANs can be used for the following applications:

VLAN unaware switching: This is the default configuration. All ports are VLAN unaware with Port VLAN ID 1 and members of VLAN 1. This means that MAC addresses are learned in VLAN 1, and the switch does not remove or insert VLAN tags.

VLAN aware switching: This is based on the IEEE 802.1Q standard. All ports are VLAN aware. Ports connected to VLAN aware switches are members of multiple VLANs and transmit tagged frames. Other ports are members of one VLAN, set up with this Port VLAN ID, and transmit untagged frames.

Provider switching: This is also known as Q-in-Q switching. Ports connected to subscribers are VLAN unaware, members of one VLAN, and set up with this unique Port VLAN ID. Ports connected to the service provider are VLAN aware, members of multiple VLANs, and set up to tag all frames. Untagged frames received on a subscriber port are forwarded to the provider port with a single VLAN tag. Tagged frames received on a subscriber port are forwarded to the provider port with a double VLAN tag.